BUNKER HILL

PRODUCTS

PURE LEAD - LEAD ALLOYS

NORTHWEST LEAD COMPANY

CATALOG "C"

BUNKER HILL
PRODUCTS
PURE LEAD - LEAD ALLOYS

NORTHWEST LEAD COMPANY

2700 SIXTEENTH AVENUE SOUTHWEST

SEATTLE, WASHINGTON

San Francisco Los Angeles Oakland Sacramento Salt Lake City

LEAD INDUSTRIES
RELY ON LEAD
ASSOCIATION

INDEX

NORTHWEST LEAD COMPANY

a Subsidiary of

Bunker Hill & Sullivan Mining & Concentrating Co.

The Bunker Hill Mine, at Kellogg, Idaho, is one of the world's largest lead producers. Since 1885, when a grub-stake prospector made its discovery, it has yielded over fifteen million tons of ore. Its workings now extend sixty miles underground, attaining a depth of more than four thousand feet, reaching two hundred feet below sea level, the lowest point, incidentally, in the State of Idaho.

The Bunker Hill Mine output is smelted at the adjoining Bunker Hill Smelter, which, besides pure virgin lead, also refines quantities of other non-ferrous metals, including silver and gold.

In the Western United States and countries bordering the Pacific, the Northwest Lead Company—a subsidiary of Bunker Hill and Sullivan Mining and Concentrating Company—has operated since 1917 as a manufacturing outlet, as illustrated in the following pages.

The great ore reserves of the Bunker Hill Mine assure a continuous supply of Bunker Hill pure lead; and the manufacturing facilities of the Northwest Lead Company give further guarantee of the maintenance of the high quality of this lead in its manufactured form.

Mine crew coming off shift in mine cars at main entrance to Bunker Hill mine.

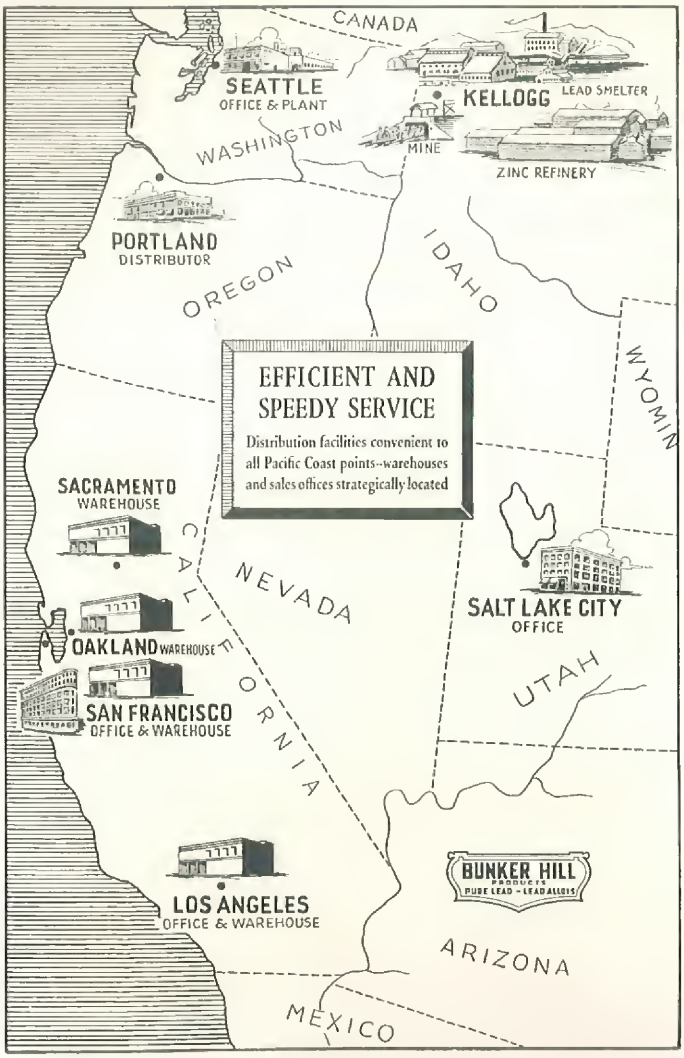
One hundred-ton desilverizing kettles at the Smelter. A step in purifying Bunker Hill lead.

NOTE: All illustrations throughout this catalog (with the exception of photo-micrographs), are of Bunker Hill Brand products.

Bunker Hill Smelter, Kellogg, Idaho.

BUNKER HILL PRODUCTS PURE LEAD - LEAD ALLOYS

Manufacturing Plant, Seattle, Washington



Northwest Lead Company

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The benefit of many years experience and progress is reflected in the lead and lead-alloy products offered you under the Bunker Hill trade name, and it is our intention that you shall find our trademark synonymous with quality and service in every respect.

Several factors combine to assure consistently high quality: our close affiliation with the mining and smelting of Bunker Hill lead; our modern manufacturing equipment; and a personnel thoroughly familiar with every phase of lead production and installation.

For service and satisfaction, demand

Bunker Hill Brand

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NORTHWEST LEAD COMPANY

Bunker Hill pig lead weighs approximately one hundred pounds per pig. Note compactness and ease of stacking, due to convenient shape.

Only pure virgin lead from the Bunker Hill Mine and Smelter, of Northern Idaho, is used in the production of this high quality pig lead.

BUNKER HILL PIG LEAD

Bunker Hill pig lead is used by us in the manufacture of our general line of pure lead and lead-alloy products.

Because of its freedom from impurities, Bunker Hill pig lead is specified by many of the paint and pigment manufacturers, chemical industries, insecticide manufacturers, etc., all of whom require pure virgin lead in their processes. It is also the ideal calking material for water-main or sewer-line work, due to its softness and calking qualities.

Besides pure lead, we also furnish lead alloys in pig form, made up to specification.

LEAD REQUIRED PER JOINT OF CAST IRON PIPE

Pipe Size, Inches	*Standard Soil Pipe Pounds	*Extra Heavy Soil Pipe, Pounds	**Water Pipe Pounds
3	1.69	2.25	6.00
4	2.25	3.00	7.50
6	3.38	4.50	10.25
8	4.50	6.00	13.25
10	5.63	7.50	16.00
12	.....	.....	19.00
14	.....	.....	22.00
16	.....	.....	30.00
18	.....	.....	33.80
20	.....	.....	37.00
24	.....	.....	44.00
30	.....	.....	54.25
36	.....	.....	64.75
42	.....	.....	75.25
48	.....	.....	85.50
54	.....	.....	97.60
60	.....	.....	108.30
72	.....	.....	146.00
84	.....	.....	170.00

*Based on 1 in. depth of joint.
**Based on 2 in. depth of joint.

The purity and softness of Bunker Hill pig lead makes it most satisfactory for calking purposes in large or small lines.

BUNKER HILL PRODUCTS PURE LEAD - LEAD ALLOYS

Pure lead — easily calked.

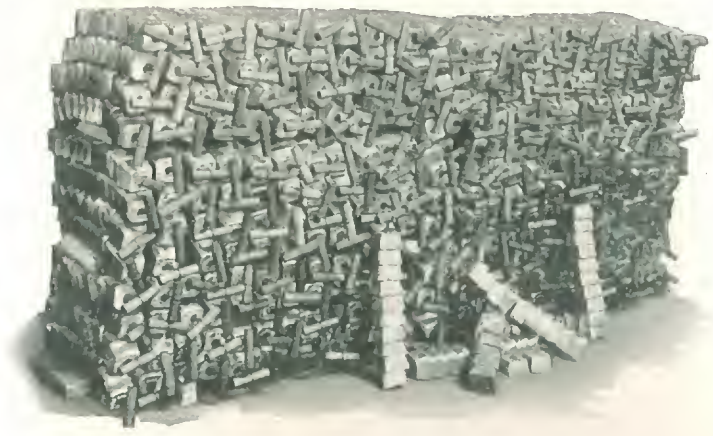
BUNKER HILL CALKING LEAD

Bunker Hill calking lead package. Ten five-pound ingots to the string.

Supplied in five-pound ingots, packed in units of fifty pounds — ten ingots being securely held together with heavy annealed wire, with wooden handle for convenience in carrying. This patented method simplifies the removal of ingots, while retaining a compact bundle with the remainder.

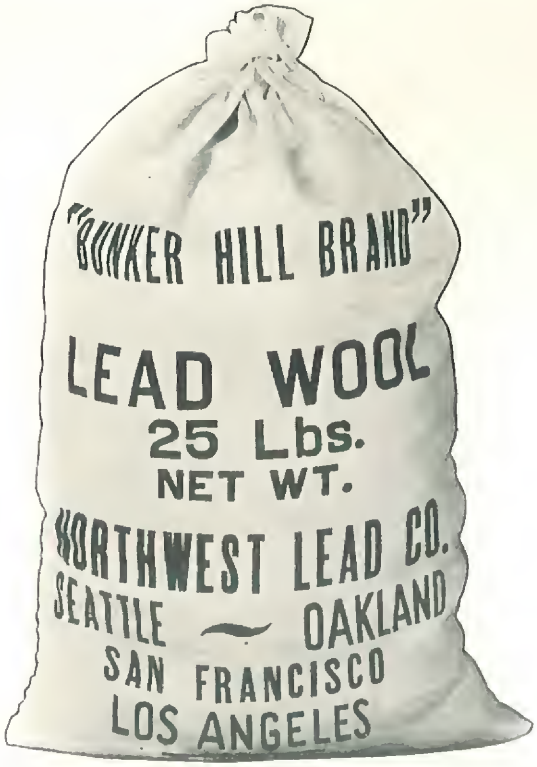
Made from the same pure virgin lead as Bunker Hill pig lead, providing a soft, easily-calked material in convenient size for small joint work.

(See preceding page for listing of lead required per joint of cast iron pipe.)



A seven and one-half-ton stack of Bunker Hill calking lead. The compact 50-lb. units simplify storage and save floor space.

BUNKER HILL LEAD WOOL



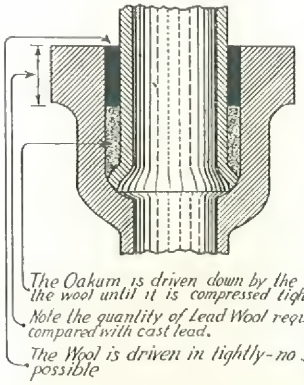
Made of very fine continuous strands of extruded lead, in loose rope form. It is sometimes referred to as "shredded lead."

Lead wool is principally used for calking joints in waste, sewer, gas and water pipe lines. It is also used extensively in the oil fields for shutting off bottom-water in wells.

Lead wool is worked cold. It requires no preheating or preparation of any kind and can be used in wet trenches or even under water.

It makes a tight joint, with no contraction after calking. It allows a flexibility in the joint not possible with other materials and will remain water-tight up to a deflection of fifteen degrees.

Bunker Hill lead wool is made of pure soft lead. It is the ideal calking material.



STOCK PACKAGES

Bunker Hill lead wool is packed in units convenient for the job of any size.

Now supplied in

25 lb. Sacks — 50 lb. Sacks

25 lb. Cartons — 100 lb. Sacks

125 lb. Spools.

Bunker Hill Lead Wool is ideal for the wet trench job such as this. It is calked cold. No heating—no banding of joints.

FACTS ABOUT BUNKER HILL LEAD WOOL

Because it is calked cold, it is more economical than molten materials, saving time and expense in eliminating dross and oxidation, heating, stirring, banding of joints, pouring, etc.

There is no waste with lead wool. All the material is used.

The line calked with lead wool can be inspected immediately after calking.

Repairs can also be made without shutting down the system, and it can be used in any kind of weather.

Joints as deep as fifty and sixty feet under water have been successfully calked with Bunker Hill lead wool.

Its flexibility permits a greater deflection of the pipe and a great savings in split and cracked hubs.

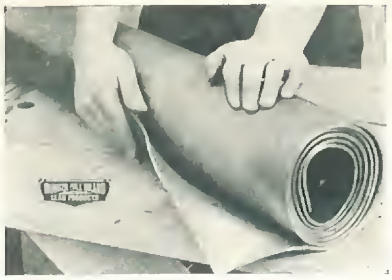
It is indispensible for calking inverted and other difficult joints.

Calking a joint on eight-foot concrete water pipe with Bunker Hill Lead Wool. Insert illustrates fine texture of the product.

ESTIMATED AMOUNT OF LEAD WOOL REQUIRED PER JOINT

Lead wool joints are generally made about one and one-quarter inch deep. Therefore, to compute the amount required, refer to the listing for water pipe on page 3 and multiply by .625 (5/8). The resultant figure will approximate the amount of lead wool needed.

Close-up of Bunker Hill Lead Wool, showing the shredded appearance and the fineness of the strands.



Bunker Hill Sheet Lead is accurate in thickness and dimensions. It is a quality product.

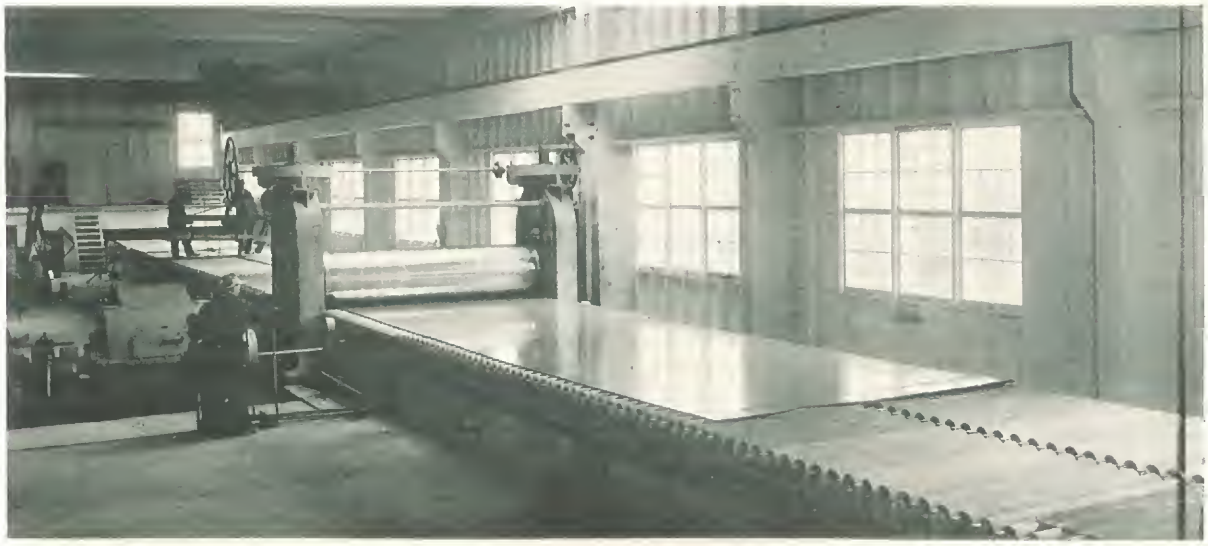
BUNKER HILL BRAND SHEET LEAD

Supplied in pure, soft lead, antimonial lead, and other lead alloys according to specification.

Sheet lead is produced by rolling huge lead slabs, averaging five tons in weight, between steel rolls until the desired thickness is attained. The width of the sheet is limited to the width of the steel rolls between which it is passed, but its length may extend to forty or fifty feet when necessary.

Our manufacturing methods embody a close inspection of the product from the time pure lead, or lead alloy, is cast into slab form until it has been rolled out to specification. This process is so closely guarded that we can unreservedly guarantee all Bunker Hill sheet lead to be free from lamination, pitting, or other defects when leaving our plant.

Our modern rolling equipment insures uniformity in thickness and weight throughout each sheet. Bunker Hill sheet lead will meet your strictest specification.



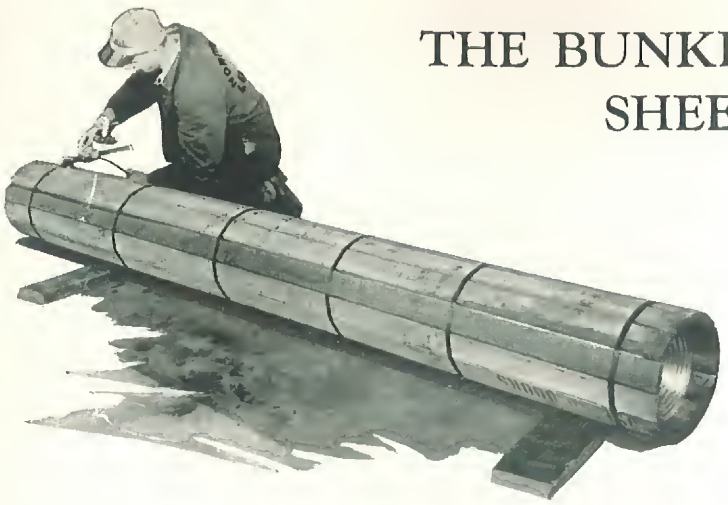
Rolling Bunker Hill Sheet Lead at Northwest Lead Company plant.
Pure lead and lead alloy sheets are rolled here.

WEIGHTS, THICKNESS AND STOCK SIZES OF BUNKER HILL SHEET LEAD

*Pounds per Sq. Ft.	Actual Thickness	Thickness in inches		Sizes of Standard Rolls		Weight per Roll	
		Approx. Fraction	Actual Decimal	Pure Lead	**Anti-monial	Pure Lead	**Anti-monial
1		1/64	.017	8'6" x 25'	8' x 25'	215	195
1½		3/128	.025	8'6" x 25'	8' x 25'	320	290
2		1/32	.033	8'6" x 25'	8' x 25'	425	385
2½		1/24	.040	8'6" x 25'	8' x 25'	530	480
3		3/64	.048	8'6" x 25'	8' x 25'	640	575
4		1/16	.065	8'6" x 25'	8' x 25'	850	770
5		5/64	.085	8'6" x 25'	8' x 25'	1,060	960
6		3/32	.098	8'6" x 25'	8' x 25'	1,275	1,150
7		7/64	.115	8'6" x 25'	8' x 25'	1,490	1,345
8		1/8	.133	8'6" x 25'	8' x 25'	1,700	1,535
10		5/32	.165	8'6" x 25'	8' x 25'	2,125	1,920
12		3/16	.200	8'6" x 25'	8' x 25'	2,550	2,300
14		7/32	.233	8'6" x 25'	8' x 25'	2,975	2,690
16		1/4	.265	8'6" x 25'	8' x 20'	3,400	2,460
20		5/16	.335	8'6" x 25'	8' x 18'	4,250	2,765
24		3/8	.400	8'6" x 25'	8' x 16'	5,100	2,950
30		1/2	.505	8'6" x 25'	.....	6,800	....

*Weight per square foot applies to pure, soft lead only. Antimonial lead and other alloys weigh slightly less. Antimonial and other alloys of lead should be ordered by thickness rather than by weight.

**Above listings of antimonial lead are based on an antimony alloy of six per cent.



THE BUNKER HILL SHEET LEAD PACKAGE

Our rolls of sheet lead are packed in wooden slats, milled to fit the shape of the roll, and securely fastened with strong steel strapping, thus making a tight, compact shipping package.

The illustration shows a roll of Bunker Hill sheet lead being packed. Wooden plugs will be inserted in each end prior to shipping, to fully protect the lead.

SHEET LEAD ALLOYS

ANTIMONIAL (HARD) LEAD: By alloying pure Bunker Hill lead with a small percentage of antimony, a harder and more rigid sheet of greater tensile strength is produced although there are limitations to its use. We have found, after many years' research, that in antimonial sheet lead an alloy of six percent is most practical for all general purposes, and unless otherwise specified, this content is always supplied.

TELLURIUM LEAD: This is a relatively new alloy which may be used with both pure and antimonial sheet lead to produce a tougher and stronger product. See supplement pages T-1 to T-4 for details.

COPPER-CONTENT LEAD, (Sometimes referred to as "Chemical Lead"): Under certain operating conditions it has been determined that sheet lead (either pure or antimonial) can be improved by the addition of a very small amount of copper. We can supply this alloy to your specification.

ARSENIC LEAD: We are also suppliers of arsenic-content sheet lead. This alloy (otherwise considered a detriment in lead) is occasionally specified for unusual service requirements. We do not recommend its use except under specific conditions.

OTHER SHEET LEAD ALLOYS: We are constantly endeavoring to improve present sheet lead alloys and to determine the value of new products. If your operations present difficulties with ordinary lead we will be glad to work with you toward developing an alloy that will more satisfactorily meet your requirements.

Note: We do not recommend the use of other than pure Bunker Hill sheet lead until the alloy best suited to your operations has been determined.

DUE TO WEIGHT VARIATIONS, SHEET LEAD ALLOYS SHOULD BE ORDERED BY THICKNESS—NOT BY WEIGHT.

Sheet Lead Shower Pan Installation. The lead was painted with asphaltum before covering.

SHEET LEAD FOR SHOWER PANS

Lead provides the most satisfactory means of waterproofing for shower pan work. Properly installed, it will outlast any building in which it is used; it is pliable; fits the job; and will give without fracture when settling occurs.

Almost all codes specifying lead call for six-pound (3/32") sheet lead for shower pans. Cement work on which it is placed should be at least twenty-eight days old. "Green" and rough concrete should be avoided. Joints should be tested for water-tightness before covering the lead. The concrete and both sides of the lead should be painted with asphaltum, or a similar material.

If these simple precautions are observed, the lead shower pan will give trouble-free, permanent service.

SHEET LEAD FOR X-RAY LININGS

Lead, being highly absorptive of X-Rays, has become the standard material for lining rooms in which X-Rays and radium are used.

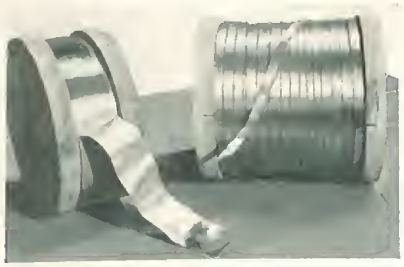
Bunker Hill lead, being free from impurities, is ideal for this purpose. We constantly supply the X-Ray trade with Bunker Hill lead and are prepared to give you estimates on material and installation.

Lead Lining an X-Ray Room. The lead overlaps sufficiently to cover metal fastenings of under sheets.

THICKNESS OF LEAD REQUIRED FOR X-RAY PROTECTION

X-Rays Generated by Peak Voltages	Minimum Equivalent Thickness of Lead	
	mm.	inches
Not Exceeding 75 kv.	1.0	0.039
" " 100 kv.	1.5	0.059
" " 125 kv.	2.0	0.079
" " 150 kv.	2.5	0.098
" " 175 kv.	3.0	0.118
" " 200 kv.	4.0	0.157
" " 225 kv.	5.0	0.197
" " 300 kv.	9.0	0.351
" " 400 kv.	15.0	0.585
" " 500 kv.	22.0	0.858
" " 600 kv.	34.0	1.326

(Table taken from U. S. Bureau of Standards Handbook No. 15.)



BUNKER HILL RIBBON LEAD

MAST COATING—STRIP LEAD

This material is produced by extruding through dies, so that uniform dimensions are maintained throughout. Furnished on fifty- pound and hundred-pound spools, in continuous lengths, unless otherwise specified.

Thickness, Inches	Width, Inches	Length, Per Pound
1/32	– 5/8	9′ 7″
1/32	3 –	2′ –
1/24	– 3/4	6′ –
3/64 (Scant)	– 1/4	16′ –
3/64 (Full)	– 1/2	8′ –
3/64 (Scant)	– 5/8	6′ 5″
3/64	1 –	4′ –
3/64	2 1/2	1′ 7″
3/64 (Full)	4 –	1′ –
1/16	– 1/2	6′ –
1/16	– 5/8	4′ 9″
1/16	– 3/4	4′ –
1/16	1 –	3′ –
1/16	2 1/2	1′ 2″
1/16	3 –	1′ –
1/16	3 1/2	– 10″
1/16	4 –	– 9″
3/32	2 1/2	– 9 1/2″
3/32	3 3/4	– 6 1/2″
3/32	4 –	– 6″
1/8	– 5/8	2′ 5″
1/8	1 –	1′ 6″
1/8	1 1/2	1′ –
1/8	2 –	– 9″
1/8	4 –	– 4 1/2″
1/8	6 –	– 3″

Thickness, Inches	Width, Inches	Length, Per Pound
5/32	2 1/2	– 6″
5/32	3 –	– 5″
5/32	6 –	– 2 1/2″
3/16	– 1/2	2′ –
3/16	– 5/8	1′ 7″
3/16	– 3/4	1′ 4″
3/16	3 –	– 4″
3/16	5 –	– 2 1/2″
3/16	6 –	– 2″
1/4	– 1/4	3′ –
1/4	– 3/8	2′ –
1/4	– 1/2	1′ 6″
1/4	– 5/8	1′ 3″
1/4	1 –	– 9″
1/4	2 1/2	– 4″
1/4	3 –	– 3″
1/4	4 –	– 2 1/2″
1/4	5 –	– 1 3/4″
1/4	6 –	– 1 1/2″
3/8	– 3/8	1′ 4″
3/8	– 1/2	1′ –
3/8	1 –	– 6″
1/2	2 –	– 2 1/2″
5/8	– 5/8	– 5 1/2″
5/8	2 1/2	– 1 1/2″

LEAD FLASHING

For use in roof flashing, sheet metal work, etc. Made of pure Bunker Hill lead, in following convenient rolls:

Thickness	Width, Inches	Length, (Approx.) Feet	Weight per Roll (Approx.) Pounds
2½ lb.—1/24″	12	25	65
2½ lb.—1/24″	14	25	75
3 lb.—3/64″	12	25	75
3 lb.—3/64″	14	25	90

Other sizes furnished to order.

IMPRESSION LEAD

We are regular suppliers of smooth-surfaced impression (sheet) lead to the engraving and printing trades. Furnished in all standard sizes and widths. Carefully packed to reach you in perfect condition.

Lead roofs provide architectural beauty and permanent service. A Western cathedral roofed with Bunker Hill Lead.

Lead linings for acid tanks. Workmen installing Bunker Hill Lead in a Foamite tank. Insert shows detail of lead-burning operation on seams of lining.

X-Ray Room, showing operator's booth lined with Bunker Hill Lead. See Page ten for details of X-Ray lead work.

A FEW LARGE USES OF SHEET LEAD

Many tons of lead are annually used in the electrolytic refining of copper, zinc, etc. Photo shows Bunker Hill Sheet Lead lining on a series of huge outdoor tanks at a large Western copper property. Note the pipe lines of Bunker Hill Lead at the extreme right of tanks.

Extruding Bunker Hill Lead Pipe on a hydraulic press.

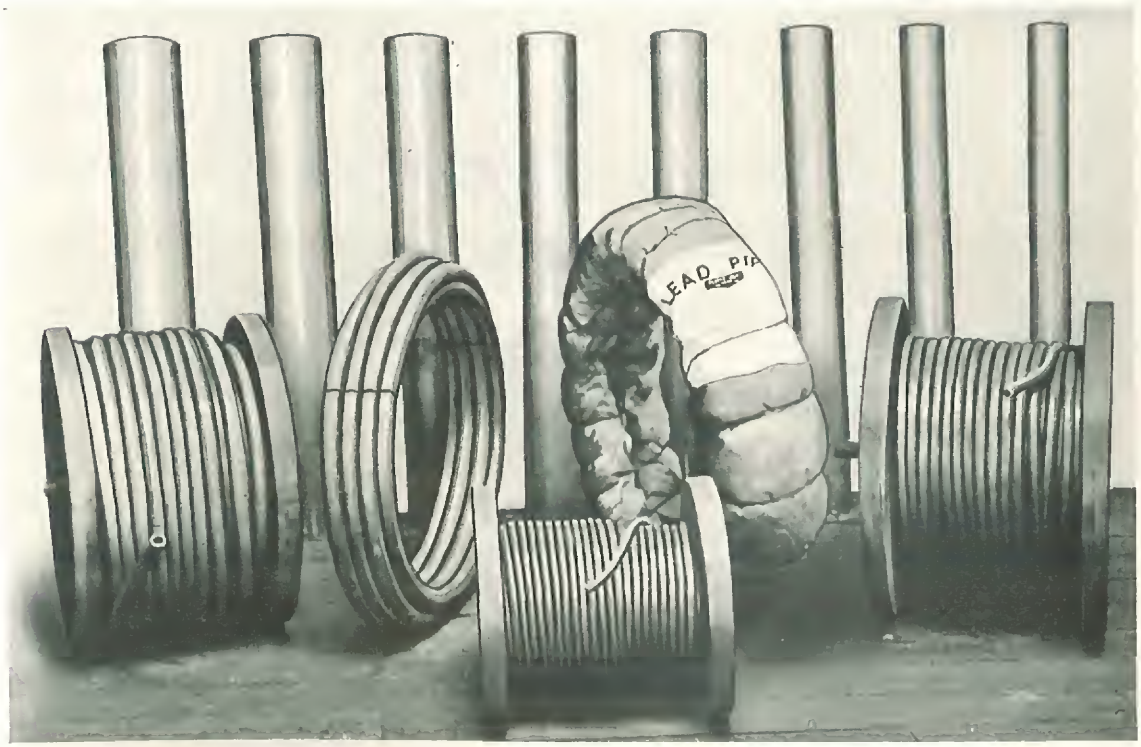
BUNKER HILL LEAD PIPE

Our lead pipe is made of Bunker Hill Brand pure lead, extruded under pressures up to one thousand tons. The manufacturing process insures a seamless lead pipe, with smooth bore and uniform thickness. We guarantee all Bunker Hill lead pipe to be free from lamination, dross pockets, imperfect walls, or other defects.

For special industrial purposes, lead pipe is often made with the addition of various alloys, which—under certain conditions—give added hardness, increased tensile strength, etc. Details of these alloys are given on Pages 9 and 20.

We are the only West Coast manufacturer producing seamless lead pipe up to twelve inches in diameter.

The following listing of lead pipe sizes—with a few exceptions—can be supplied in antimonial lead and other alloys, as well as pure lead. This listing comprises more than two hundred and fifty sizes, ranging from 5/32″ tubing to 12″ inside diameter lead pipe. Sizes not listed can often be made up to your special order.



ADVANTAGES OF LEAD PIPE FOR WATER SERVICE

Some of the reasons why lead pipe is preferable to other materials for water service are: A record of efficiency and permanence—it has been used for centuries. Its cost per year of service is less. Lead pipe will not rust. It offers less resistance to the flow of water than other metals. It is flexible and can be bent around objects in its path, without the use of joints. Lead pipe will withstand settling without fracture. Properly installed, it will outlast the building in which it is placed.

NATIONAL STANDARDIZATION OF LEAD PIPE

The Lead Industries Association has approved a standard of lead pipe sizes which is being adopted by principal lead manufacturers. Our listings of "Standard" Bunker Hill lead pipe, in sizes from $\frac{3}{8}$" to 6", inclusive, conform to this national standardization. In addition, we also manufacture numerous "Special" sizes, principally required for industrial work.

WORKING PRESSURES OF LEAD SERVICE PIPE

In sizes from $\frac{3}{8}$" to 2", inclusive, Bunker Hill lead pipe (in conformity with the above standardization), will safely withstand constant cold water pressures as follows:

Classification	Safe Pressures in Lbs. per Square Inch
A or S	50
AA or XS	75
AAA or XXS	100

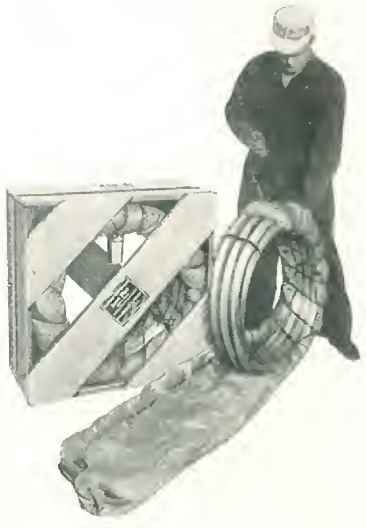
PACKING BUNKER HILL PIPE

Lead tubing, $\frac{5}{16}$" and smaller, is shipped on small wooden spools, approximately one hundred pounds per spool.

Lead pipe, in sizes from $\frac{3}{8}$" to $1\frac{1}{2}$", inclusive, is shipped in coils—well wrapped and crated. Most of these sizes, as shown in the following listing, can also be furnished on reels of approximately nine hundred and fifty pounds, when desired.

Lead pipe, $1\frac{3}{4}$" and larger, is packed in wooden boxes. Standard length on these sizes is ten feet, unless otherwise specified.

For detail on the furnishing of special coils of large size pipe, see Page 52.



BUNKER HILL LEAD PIPE SIZES

(NOTE: Bold face type indicates a standard size, carried in stock. Light face italic type indicates a special size, usually involving some time to produce when ordered.)

In listing wall thicknesses, the letter "S" indicates "scant"; the letter "F" indicates "full".

LEAD TUBING

(On Spools unless otherwise specified.)

CALIBER	INSIDE DIAMETER INCHES	WALL THICKNESS 1/100 IN.	WALL THICKNESS FRACTION, IN.	OUTSIDE DIAMETER 1/100 IN.	WEIGHT PER FOOT	FEET PER SPOOL
UNCLASSIFIED	*5/32*	*.031*	*1/32*	*.219*	*1 oz.*	*1650*
"	3/16	.047	3/64	.281	3 oz.	570
"	*1/4*	*.031*	*1/32*	*.313*	*2 oz.*	*865*
"	1/4	.063	1/16	.375	5 oz.	355
"	*1/4*	*.094*	*3/32*	*.434*	*8 oz.*	*215*
"	*1/4*	*.125*	*1/8*	*.5*	*12 oz.*	*145*
"	*5/16*	*.031*	*1/32*	*.375*	*2 oz.*	*865*

LEAD PIPE

(In Coils or on Reels, unless otherwise specified.)

CALIBER	INSIDE DIAMETER INCHES	WALL THICKNESS 1/100 IN.	WALL THICKNESS FRACTION, IN.	OUTSIDE DIAMETER 1/100 IN.	WEIGHT PER FOOT	FEET PER COIL	FEET PER REEL
E | AQ	3/8	*.073*	*5/64 S*	*.520*	*8 oz.*	*200*	...
D | XL		.087	3/32 S	.549	10 oz.	160	...
UNCLASSIFIED		*.094*	*3/32*	*.563*	*11 oz.*	*145*	...
C | L		*.101*	*7/64 S*	*.577*	*12 oz.*	*205*	...
B | M		.128	1/8 F	.631	1 lb.	155	950
(OLD A)		*.143*	*9/64 F*	*.66*	*1 lb. 2 oz.*	*135*	*845*
A (OLD AA) S		*.175*	*11/64 F*	*.725*	*1 lb. 8 oz.*	*105*	*630*
(OLD AAA)		*.188*	*3/16 F*	*.75*	*1 lb. 12 oz.*	*85*	*540*
AA | XS		*.218*	*7/32*	*.811*	*2 lb.*	*78*	*475*
AAA | XXS		*.257*	*1/4 F*	*.888*	*2 lb. 8 oz.*	*62*	*380*
UNCLASSIFIED	*13/32*	*.0625*	*1/16*	*.53*	*7 oz.*	*227*	...
E | AQ	1/2	*.064*	*1/16 F*	*.628*	*9 oz.*	*155*	...
D | XL		.083	5/64 F	.666	12 oz.	203	...
C | L		.106	7/64 S	.712	1 lb.	155	...
B | M		*.128*	*1/8 F*	*.756*	*1 lb. 4 oz.*	*121*	*760*
A | S		*.149*	*5/32 S*	*.798*	*1 lb. 8 oz.*	*103*	*630*
(OLD A)		*.170*	*11/64 S*	*.84*	*1 lb. 12 oz.*	*87*	*540*
AA | XS		.188	3/16	.876	2 lb.	78	475
UNCLASSIFIED		*.219*	*7/32*	*.937*	*2 lb. 6 oz.*	*64*	*400*
(OLD AA)		*.225*	*15/64 S*	*.95*	*2 lb. 8 oz.*	*62*	*380*
AAA | XXS		*.256*	*1/4 F*	*1.012*	*3 lb.*	*51*	*315*
UNCLASSIFIED	*9/16*	*.062*	*1/16*	*.687*	*10 oz.*	*160*	...
E | AQ	5/8	.07	1/16 F	.765	12 oz.	203	...
D | XL		*.089*	*3/32 S*	*.803*	*1 lb.*	*155*	...
C | L		*.128*	*1/8 F*	*.881*	*1 lb. 8 oz.*	*103*	*630*
UNCLASSIFIED		*.147*	*9/64 F*	*.92*	*1 lb. 12 oz.*	*87*	*540*
B | M		*.164*	*5/32 F*	*.953*	*2 lb.*	*78*	*475*
A | S		*.197*	*13/64 S*	*1.019*	*2 lb. 8 oz.*	*62*	*380*
AA | XS		.229	15/64 S	1.082	3 lb.	51	315
AAA | XXS		.256	1/4 F	1.137	3 lb. 8 oz.	44	270

LEAD PIPE

(In Coils or on Reels, unless otherwise specified.)

CALIBER	INSIDE DIAMETER INCHES	WALL THICKNESS 1/100 IN.	WALL THICKNESS FRACTION, IN.	OUTSIDE DIAMETER 1/100 IN.	WEIGHT PER FOOT	FEET PER COIL	FEET PER REEL
UNCLASSIFIED	11/16	.186	3/16 S	1.06	2 lb. 8 oz.	62	380
E | AQ	3/4	.078	5/64	.906	1 lb.	155	...
D | XL		.095	3/32 F	.94	1 lb. 4 oz.	112	...
(OLD D)		.115	7/64	.98	1 lb. 8 oz.	103	...
C | L		.128	1/8 F	1.006	1 lb. 12 oz.	87	540
(OLD C)		.145	9/64 F	1.04	2 lb.	78	475
B | M		.159	5/32 F	1.068	2 lb. 4 oz.	69	420
UNCLASSIFIED		.187	3/16	1.125	2 lb. 12 oz.	56	345
A | S		.203	13/64	1.156	3 lb.	51	315
AA | XS		.231	15/64 S	1.212	3 lb. 8 oz.	44	270
(OLD AAA)		.260	1/4 F	1.27	4 lb.	38	235
AAA | XXS		.293	19/64 S	1.336	4 lb. 12 oz.	32	200
UNCLASSIFIED	13/16	.0937	3/32	1.00	1 lb. 7 oz.	108	...
UNCLASSIFIED	7/8	.092	3/32 S	1.06	1 lb. 6 oz.	113	...
E | AQ	1	.096	3/32 F	1.192	1 lb. 10 oz.	95	585
D | XL		.116	7/64 F	1.232	2 lb.	78	475
C | L		.142	9/64 F	1.284	2 lb. 8 oz.	62	380
B | M		.178	11/64 F	1.356	3 lb. 4 oz.	48	290
UNCLASSIFIED		.187	3/16	1.375	3 lb. 7 oz.	45	275
A | S		.214	7/32 S	1.428	4 lb.	38	235
AA | XS		.246	1/4 S	1.492	4 lb. 12 oz.	64	200
(OLD AAA)		.280	9/32	1.56	5 lb. 8 oz.	56	170
AAA | XXS		.298	19/64 F	1.596	6 lb.	52	155
UNCLASSIFIED	1 1/16	.125	1/8	1.312	2 lb. 5 oz.	67	410
UNCLASSIFIED	1 1/8	.200	13/64	1.625	5 lb. 5 oz.	29	175
E | AQ	1 1/4	.096	3/32 F	1.442	2 lb.	78	475
D | XL		.118	1/8 S	1.486	2 lb. 8 oz.	62	380
C | L		.139	9/64 S	1.528	3 lb.	51	315
B | M		.171	11/64	1.592	3 lb. 12 oz.	41	250
UNCLASSIFIED		.187	3/16	1.625	4 lb. 3 oz	37	225
A | S		.210	13/64 F	1.670	4 lb. 12 oz.	64	200
AA | XS		.258	17/64 S	1.765	6 lb.	52	155
(OLD AAA)		.290	9/32 F	1.83	6 lb. 12 oz.	46	140
AAA | XXS		.320	5/16 F	1.889	7 lb. 12 oz.	40	120
UNCLASSIFIED	1 3/8	.125	1/8	1.625	2 lb. 14 oz.	54	330
E | AQ	1 1/2	.120	1/8 S	1.74	3 lb.	51	315
UNCLASSIFIED		.135	1/8 F	1.77	3 lb. 7 oz.	45	275
D | XL		.138	9/64 S	1.776	3 lb. 8 oz.	44	270
C | L		.165	11/64 S	1.83	4 lb. 4 oz.	36	220
UNCLASSIFIED		.178	11/64 F	1.855	4 lb. 8 oz.	34	210
UNCLASSIFIED		.187	3/16	1.875	4 lb. 14 oz.	32	195
B | M		.191	3/16 F	1.882	5 lb.	31	190
(OLD A)		.225	7/32 F	1.95	6 lb.	26	155
A | S		.242	15/64 F	1.984	6 lb. 8 oz.	48	145
UNCLASSIFIED		.260	17/64 S	2.02	7 lb. 1 oz.	44	135
(OLD AA)		.275	17/64 F	2.05	7 lb. 8 oz.	40	125
AA | XS		.288	9/32 F	2.076	8 lb.	38	115
(OLD AAA)		.320	21/64 S	2.14	9 lb.	33	105
AAA | XXS		.386	25/64 S	2.272	11 lb. 4 oz.	27	85

NORTHWEST LEAD COMPANY

(Ten-foot Standard Lengths, unless otherwise specified.)

CALIBER	INSIDE DIAMETER INCHES	WALL THICKNESS 1/100 IN.	WALL THICKNESS FRACTION, IN.	OUTSIDE DIAMETER 1/100 IN.	WEIGHT PER FOOT
D | XL	1 3/4	.137	9/64 S	2.024	4 lb.
(OLD C)		.155	5/32 S	2.07	4 lb. 8 oz.
C | L		.168	11/64 S	2.086	5 lb.
UNCLASSIFIED		.187	3/16	2.125	5 lb. 10 oz.
B | M		.198	13/64 S	2.146	6 lb.
A | S		.222	7/32 F	2.193	6 lb. 12 oz.
(OLD AA)		.260	1/4 F	2.27	8 lb.
UNCLASSIFIED		.315	5/16 F	2.38	10 lb.
AA | XS		.327	21/64 S	2.404	10 lb. 8 oz.
AAA | XXS		.437	7/16	2.624	14 lb. 12 oz.
UNCLASSIFIED	1 7/8	.097	3/32 F	2.07	3 lb.
"		.375	3/8	2.625	13 lb. 1 oz.
E | AQ	2	.093	3/32	2.185	3 lb.
D | XL		.125	1/8	2.25	4 lb.
UNCLASSIFIED		.135	1/8 F	2.27	4 lb. 7 oz.
(OLD C)		.155	5/32 S	2.31	5 lb.
C | L		.177	11/64 F	2.354	6 lb.
UNCLASSIFIED		.187	3/16	2.375	6 lb. 4 oz.
B | M		.205	13/64 F	2.41	7 lb.
(OLD A)		.235	15/64 F	2.47	8 lb.
A | S		.252	1/4 F	2.503	8 lb. 12 oz.
(OLD AA)		.260	17/64 S	2.52	9 lb.
(OLD AAA)		.305	19/64 F	2.61	10 lb. 8 oz.
AA | XS		.375	3/8	2.751	13 lb. 12 oz.
AAA | XXS		.504	1/2 F	3.008	19 lb. 8 oz.
UNCLASSIFIED	2 1/8	.125	1/8	2.375	4 lb. 6 oz.
UNCLASSIFIED	2 1/4	.125	1/8	2.50	4 lb. 10 oz.
"		.187	3/16	2.625	7 lb. 1 oz.
"		.312	5/16	2.875	12 lb. 6 oz.
UNCLASSIFIED	2 3/8	.125	1/8	2.625	4 lb. 13 oz.
"		.250	1/4	2.875	10 lb. 2 oz.
E | AQ	2 1/2	.100	7/64 S	2.70	4 lb.
D | XL		.125	1/8	2.75	5 lb.
C | L		.155	5/32 S	2.81	6 lb.
UNCLASSIFIED		.187	3/16	2.875	7 lb. 12 oz.
B | M		.205	13/64 F	2.91	8 lb.
A | S		.250	1/4	3.00	10 lb. 10 oz.
AA | XS		.320	5/16 F	3.14	14 lb.
UNCLASSIFIED		.350	11/32 F	3.20	15 lb. 7 oz.
AAA | XXS		.385	3/8 F	3.27	17 lb.
UNCLASSIFIED		.406	13/32	3.312	18 lb. 4 oz.
"		.500	1/2	3.50	23 lb. 4 oz.
UNCLASSIFIED	2 5/8	.125	1/8	2.875	5 lb. 14 oz.
UNCLASSIFIED	2 3/4	.134	1/8 F	3.018	6 lb.
"		.175	11/64	3.10	8 lb.
"		.1875	3/16	3.125	8 lb. 8 oz.
UNCLASSIFIED	2 7/8	.112	7/64 F	3.10	5 lb. 4 oz.
"		.125	1/8	3.125	5 lb. 13 oz.
E | AQ	3	.080	5/64 F	3.16	4 lb.
D | XL		.100	3/32 F	3.20	4 lb. 12 oz.
C | L		.125	1/8	3.25	6 lb.
B | M		.190	3/16 F	3.38	9 lb. 6 oz.
UNCLASSIFIED		.201	13/64 S	3.402	9 lb. 15 oz.
A | S		.250	1/4	3.50	12 lb. 8 oz.
AA | XS		.315	5/16 F	3.63	16 lb.
UNCLASSIFIED		.345	11/32 F	3.69	17 lb. 13 oz.
AAA | XXS		.375	3/8	3.75	20 lb.
UNCLASSIFIED		.500	1/2	4.01	27 lb. 6 oz.

(Ten-foot Standard Lengths, unless otherwise specified.)

CALIBER	INSIDE DIAMETER INCHES	WALL THICKNESS 1/100 IN.	WALL THICKNESS FRACTION, IN.	OUTSIDE DIAMETER 1/100 IN.	WEIGHT PER FOOT
UNCLASSIFIED	3 1/4	.401	13/32 S	4.052	22 lb. 10 oz.
UNCLASSIFIED	3 3/8	.338	11/32 S	4.052	19 lb. 7 oz.
E | AQ	3 1/2	.095	3/32 F	3.69	5 lb.
D | XL		.125	1/8	3.75	7 lb.
UNCLASSIFIED		.1875	3/16	3.87	10 lb. 8 oz.
B | M		.220	13/64	3.94	12 lb.
A | S		.255	1/4 F	4.01	14 lb. 13 oz.
UNCLASSIFIED		.276	9/32 S	4.052	16 lb. 1 oz.
AA | XS		.312	5/16	4.125	18 lb. 8 oz.
UNCLASSIFIED		.315	5/16 F	4.130	18 lb. 11 oz.
"		.330	21/64 F	4.16	19 lb. 8 oz.
"		.350	11/32 F	4.19	20 lb. 8 oz.
AAA | XXS		.375	3/8	4.25	22 lb. 8 oz.
UNCLASSIFIED		.500	1/2	4.50	30 lb. 15 oz.
UNCLASSIFIED	3 5/8	.213	7/32 S	4.052	12 lb. 11 oz.
UNCLASSIFIED	3 7/8	.125	1/8	4.125	7 lb. 12 oz.
E | AQ	4	.080	5/64 F	4.16	5 lb.
D | XL		.095	3/32 F	4.19	6 lb.
C | L		.125	1/8	4.25	8 lb.
B | M		.155	5/32 F	4.31	10 lb.
UNCLASSIFIED		.190	3/16 F	4.38	12 lb. 5 oz.
"		.240	15/64 F	4.48	15 lb. 12 oz.
A | S		.250	1/4	4.50	16 lb. 6 oz.
UNCLASSIFIED		.313	5/16	4.625	20 lb. 11 oz.
AA | XS		.330	21/64 F	4.66	21 lb. 10 oz.
AAA | XXS		.375	3/8	4.75	25 lb.
UNCLASSIFIED		.406	13/32	4.812	27 lb. 11 oz.
"		.450	29/64 S	4.90	31 lb.
"		.500	1/2	5.00	34 lb. 12 oz.
UNCLASSIFIED	4 1/8	.250	1/4	4.625	16 lb. 15 oz.
UNCLASSIFIED	4 1/4	.187	3/16	4.625	12 lb. 14 oz.
UNCLASSIFIED	4 1/2	.125	1/8	4.75	9 lb.
"		.200	3/16 F	4.90	14 lb. 2 oz.
UNCLASSIFIED		.220	7/32 F	4.94	16 lb.
"		.250	1/4	5.00	18 lb. 6 oz.
"		.3125	5/16	5.12	23 lb. 1 oz.
"		.360	23/64 F	5.22	27 lb. 1 oz.
"		.375	3/8	5.25	28 lb. 4 oz.
"		.500	1/2	5.50	38 lb. 11 oz.
UNCLASSIFIED	4 3/4	.125	1/8	5.00	9 lb. 7 oz.
"		.281	9/32	5.31	21 lb. 12 oz.
E | AQ	5	.109	7/64	5.22	8 lb. 4 oz.
D | XL		.125	1/8	5.25	10 lb.
UNCLASSIFIED		.156	5/32	5.312	12 lb. 8 oz.
C | L		.190	3/16	5.38	15 lb. 4 oz.
B | M		.250	1/4	5.50	20 lb. 4 oz.
A | S		.375	3/8	5.75	30 lb. 3 oz.
UNCLASSIFIED		.440	7/16 F	5.87	37 lb. 1 oz.
AA | XS		.500	1/2	6.00	40 lb.
UNCLASSIFIED		.562	9/16	6.12	48 lb. 3 oz.
UNCLASSIFIED	5 1/4	.435	7/16 S	6.12	38 lb. 4 oz.
UNCLASSIFIED	5 1/2	.188	3/16	5.87	16 lb. 7 oz.
"		.250	1/4	6.00	21 lb. 12 oz.
"		.312	5/16	6.12	27 lb. 14 oz.
"		.375	3/8	6.25	33 lb. 8 oz.
"		.500	1/2	6.50	46 lb. 8 oz.

NORTHWEST LEAD COMPANY

(Ten-foot Standard Lengths, unless otherwise specified.)

CALIBER	INSIDE DIAMETER INCHES	WALL THICKNESS 1/100 IN.	WALL THICKNESS FRACTION, IN.	OUTSIDE DIAMETER 1/100 IN.	WEIGHT PER FOOT
UNCLASSIFIED	5 5/8	.187	3/16	6.00	16 lb. 14 oz.
UNCLASSIFIED	5 7/8	.122	1/8 S	6.12	11 lb. 6 oz.
"		.387	25/64 S	6.65	37 lb. 9 oz.
E | AQ	6	.095	3/32	6.19	9 lb. 12 oz.
UNCLASSIFIED		.125	1/8	6.25	11 lb. 13 oz.
D | XL		.135	9/64	6.27	13 lb.
UNCLASSIFIED		.156	5/32	6.312	14 lb. 13 oz
"		.188	3/16	6.37	17 lb. 12 oz.
C | L		.250	1/4	6.50	24 lb. 2 oz.
UNCLASSIFIED		.300	19/64 F	6.60	29 lb.
"		.313	5/16	6.626	30 lb. 8 oz.
"		.325	21/64 S	6.65	31 lb. 13 oz.
B | M		.375	3/8	6.75	36 lb. 8 oz.
A | S		.500	1/2	7.00	50 lb.
UNCLASSIFIED		.560	9/16	7.12	56 lb. 13 oz.
UNCLASSIFIED	6 1/2	.187	3/16	6.875	19 lb. 7 oz.
UNCLASSIFIED	6 7/8	.122	1/8 S	7.12	13 lb. 4 oz.
"		.187	3/16	7.25	20 lb. 8 oz.
UNCLASSIFIED	7	.125	1/8	7.25	13 lb. 12 oz.
"		.1875	3/16	7.375	20 lb. 14 oz.
"		.250	1/4	7.50	28 lb. 1 oz.
"		.406	13/32	7.812	46 lb. 8 oz.
"		.437	7/16	7.875	50 lb. 6 oz.
"		.500	1/2	8.00	58 lb. 1 oz.
UNCLASSIFIED	7 1/2	.156	5/32	7.812	18 lb. 7 oz.
"		.187	3/16	7.875	22 lb. 4 oz.
"		.250	1/4	8.00	30 lb.
"		.500	1/2	8.50	62 lb. 14 oz.
UNCLASSIFIED	7 3/4	.187	3/16	8.125	23 lb.
UNCLASSIFIED	8	.188	3/16	8.38	24 lb.
"		.250	1/4	8.50	32 lb.
"		.313	5/16	8.625	40 lb. 8 oz.
"		.375	3/8	8.75	48 lb. 8 oz.
"		.406	13/32	8.812	50 lb. 13 oz.
"		.437	7/16	8.875	57 lb. 2 oz.
"		.500	1/2	9.00	65 lb. 12 oz.
"		.625	5/8	9.250	83 lb. 7 oz.
"		.750	3/4	9.50	101 lb. 9 oz.
UNCLASSIFIED	9	.250	1/4	9.50	35 lb. 12 oz.
UNCLASSIFIED	9.90	.250	1/4	10.40	38 lb.
UNCLASSIFIED	10	.250	1/4	10.50	40 lb.
"		.3125	5/16	10.625	49 lb. 14 oz.
"		.375	3/8	10.75	60 lb. 4 oz.
"		.500	1/2	11.00	81 lb. 4 oz.
UNCLASSIFIED	11	.250	1/4	11.50	43 lb. 8 oz.
"		.405	13/32 S	11.81	71 lb. 7 oz.
"		.750	3/4	12.50	136 lb. 7 oz.
UNCLASSIFIED	11 1/2	.155	5/32 S	11.81	27 lb. 15 oz.
"		.500	1/2	12.50	92 lb. 14 oz.
"		.625	5/8	12.75	117 lb. 4 oz.
"		.750	3/4	13.00	142 lb. 4 oz.
UNCLASSIFIED	12	.250	1/4	12.50	47 lb. 8 oz.
"		.375	3/8	12.75	71 lb. 13 oz.
"		.500	1/2	13.00	96 lb. 12 oz.
"		.750	3/4	13.50	148 lb.

ELLIPTICAL LEAD PIPE

(Ten-foot Standard Lengths, unless otherwise specified.)

INSIDE DIAMETER INCHES	WALL THICKNESS 1/100 IN.	WALL THICKNESS FRACTION, IN.	OUTSIDE DIAMETER INCHES	WEIGHT PER FOOT
3 1/4 x 8 1/8	.188	3/16	3 5/8 x 8 1/2	17 lb. 12 oz.
3 1/4 x 8 1/8 (Commonly known as 3¼x8)	.250	1/4	3 3/4 x 8 5/8	24 lb. 2 oz.
4 3/8 x 10 3/8	.188	3/16	4 3/4 x 10 3/4	24 lb.
4 3/8 x 10 3/8 (Commonly known as 4½x10½)	.250	1/4	4 7/8 x 10 7/8	32 lb.

Elliptical lead and lead alloy pipe is manufactured for use in gas coolers, where it is essential to have a maximum cooling surface in relation to the volume of the pipe. See Pages 51 and 58 for typical installations of this type of pipe.

TO ASCERTAIN WEIGHT OF PIPE

To ascertain the weight of metal pipe, the diameter and thickness of metal being given: (Winslow) Rule—Multiply the square of its exterior diameter in inches by the weight of 12 cylindrical inches, then multiply the square of its interior diameter in inches by the same factor, subtracting the product of the latter from that of the former; the remainder will be the weight. [The weight of 12 cylindrical inches (1 foot in length and 1 inch in diameter) of lead is 3.8697 lbs.]

EXAMPLE—Required: Weight of a lead pipe 1,200 feet long; exterior diameter, $\frac{7}{8}$ inch; interior diameter, $\frac{9}{16}$ inch:

$$\frac{7}{8} \times \frac{7}{8}\frac{49}{64} = 0.765625$$

And

$$\frac{9}{16} \times \frac{9}{16}\frac{81}{256} = 0.316406$$

$$0.765625 - 0.316406 = 0.449219 \times 3.8697 \times 1200 = 2086 \text{ lbs.}$$

NOTE: For Lead Pipe containing from 4% to 6% Antimony, figure approximately 3½% less weight than pure lead.

LEAD PIPE ALLOYS

General data covering Sheet Lead Alloys, as listed on Page 9, will also apply to the manufacture and use of Bunker Hill Lead Pipe Alloys.

There is, however, one exception to this: Antimonial Sheet Lead with an alloy of six percent antimony has proven superior to alloys of other percentages and we find it advisable to recommend the use of this percentage for all general Antimonial Sheet Lead work. This is not always true with Antimonial Lead Pipe where it may be found advantageous, under certain operating conditions, to use various alloys of from two percent to ten percent antimonial content. We can supply any of these percentages upon short notice.

As in Antimonial Sheet Lead, where antimonial content is not specified in the order, we customarily furnish six percent Antimonial Lead Pipe.

LEAD PIPE IN PLUMBING

Besides the use of lead pipe for water service, (see page 14), it is commonly used in waste plumbing systems. Lead wastes and vents, properly installed, will normally give permanent trouble-free service. A plumbing system laid out with waste lines of lead pipe, lead traps and bends, will always make a good job for the plumber, as well as the owner. We will be glad to supply details concerning the use of Bunker Hill lead in plumbing, upon request.

LEAD PIPE FOR MARINE WORK

Experience and tests have proven that lead is superior to any other common metal for use in contact with salt water. For this reason it is widely used in marine work of all kinds. The purity of Bunker Hill lead makes it especially adaptable to marine work and we are suppliers of lead pipe in standard and special sizes for this purpose.

Details of Bunker Hill lead products for other marine uses are listed on pages 33 to 38.

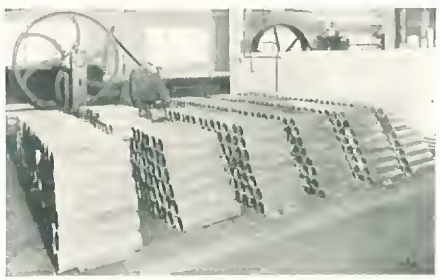
LEAD SLEEVING FOR ELECTRICAL WORK

Lead sleeving is used for the splicing of lead-covered telephone, telegraph and power cables, of underground, submarine, or overhead type. Supplied in stock sizes or cut lengths as required. State inside diameter and length when ordering. Unless otherwise specified, the following wall thicknesses are supplied:

Size I. D.	Thickness of Wall	Size I. D.	Thickness of Wall
1 in.	1/8 in.	3 in.	3/16 in.
1 1/4 in.	1/8 in.	3 1/2 in.	3/16 in.
1 1/2 in.	1/8 in.	4 in.	3/16 in.
1 3/4 in.	1/8 in.	4 1/2 in.	3/16 in.
2 in.	1/8 in.	5 in.	3/16 in.
2 1/4 in.	1/8 in.	5 1/2 in.	3/16 in.
2 1/2 in.	1/8 in.	6 in.	3/16 in.
2 3/4 in.	1/8 in.		

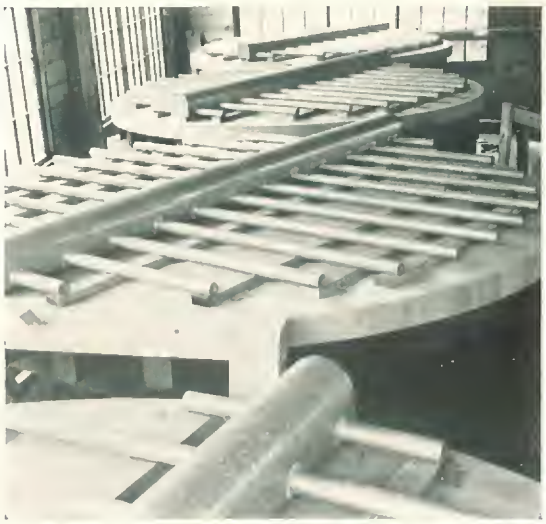
STOCK QUANTITIES OF SLEEVING

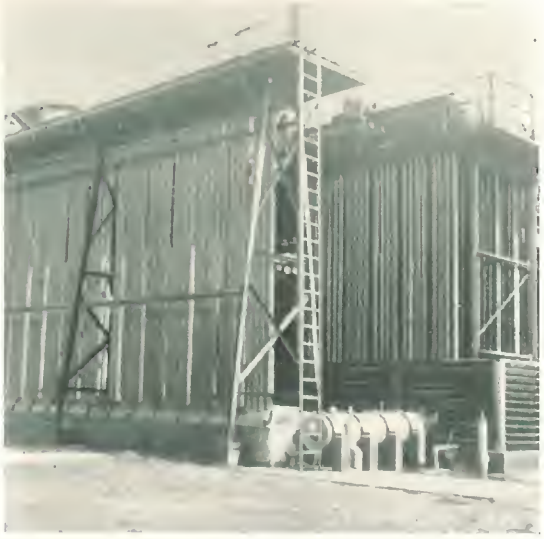
1 in. stocked in coils of approximately 75 feet.
1 1/4 in. stocked in coils of approximately 60 feet.
1 1/2 in. stocked in coils of approximately 50 feet.
1 3/4 in. and larger stocked in 10-foot lengths.



Stacks of Bunker Hill Lead Sleeves for use by a large Western telephone company.

The standard, stock quantities of sleeving shown above are usually carried on hand. Special sizes, in shorter or longer lengths, can also be supplied on short notice.





At left: Bunker Hill lead filter units on tank bottoms in a sulphite pulp system.
At right: Part of Bunker Hill piping in the acid works of a western chemical plant.

LEAD PIPE FOR INDUSTRIAL USES

Lead pipe is indispensable in the processes of many industries, where it is necessary to handle corrosive acids, liquors or fumes.

In the manufacture of such acids as sulphuric, aluminum sulphate, ammonium sulphate, hydrofluoric, phosphoric, sodium chloride, sulphurous, zinc chloride, sodium sulphite, and many others, lead is often of primary importance. For such purposes lead piping must be high in purity and quality of workmanship.

The quality of Bunker Hill lead pipe is attested by the fact that for many years it has been constantly used by practically all West Coast oil refineries, acid plants, electrolytic metal refineries, powder plants, chemical manufacturers, pulp and paper mills and for innumerable other industrial purposes.

Bunker Hill lead pipe is supplied in pure lead, antimonial lead, and other lead alloys made to specification.

(For listing of acids with which lead may be used, see page 61).

Lines of twelve-inch seamless Bunker Hill Lead Pipe used for conveying acid in the leaching plant of a copper refinery.

LOOK FOR THESE MARKINGS ON APPROVED LEAD PIPE SIZES

In conformity with the national standardization of lead pipe for plumbing purposes, our following sizes will bear three markings, as illustrated. These three marks indicate that the product is made according to the Lead Industries Association specifications and fully meets the approved standards as to weight per foot, quality of product, and method of manufacture.

Showing markings which appear on our new standards of lead pipe.

SIZE I.D.	CLASSIFICATION	SIZE O.D.	WEIGHT PER FT.
3/8	D	.549	10 oz.
	C	.577	12 oz.
	B	.631	1 lb.
	A	.725	1 lb. 8 oz.
	AA	.811	2 lb.
	AAA	.888	2 lb. 8 oz.
1/2	D	.666	12 oz.
	C	.712	1 lb.
	B	.756	1 lb. 4 oz.
	A	.798	1 lb. 8 oz.
	AA	.876	2 lb.
	AAA	1.012	3 lb.
5/8	D	.803	1 lb.
	C	.881	1 lb. 8 oz.
	B	.953	2 lb.
	A	1.019	2 lb. 8 oz.
	AA	1.082	3 lb.
	AAA	1.137	3 lb. 8 oz.
3/4	D	.94	1 lb. 4 oz.
	C	1.006	1 lb. 12 oz.
	B	1.068	2 lb. 4 oz.
	A	1.156	3 lb.
	AA	1.212	3 lb. 8 oz.
	AAA	1.336	4 lb. 12 oz.
1	D	1.232	2 lb.
	C	1.284	2 lb. 8 oz.
	B	1.356	3 lb. 4 oz.
	A	1.428	4 lb.
	AA	1.492	4 lb. 12 oz.
	AAA	1.596	6 lb.
1¼	D	1.486	2 lb. 8 oz.
	C	1.528	3 lb.
	B	1.592	3 lb. 12 oz.
	A	1.670	4 lb. 12 oz.
	AA	1.765	6 lb.
	AAA	1.889	7 lb. 12 oz.
1½	D	1.776	3 lb. 8 oz.
	C	1.83	4 lb. 4 oz.
	B	1.882	5 lb.
	A	1.984	6 lb. 8 oz.
	AA	2.076	8 lb.
	AAA	2.272	11 lb. 4 oz.
1¾	D	2.024	4 lb.
	C	2.086	5 lb.
	B	2.146	6 lb.
	A	2.193	6 lb. 12 oz.
	AA	2.404	10 lb. 8 oz.
	AAA	2.624	14 lb. 12 oz.
2	D (See Footnote)	2.250	4 lb.
	D(LIA)	2.284	4 lb. 12 oz.
	C	2.354	6 lb.
	B	2.41	7 lb.
	A	2.503	8 lb. 12 oz.
	AA	2.751	13 lb. 12 oz.
	AAA	3.008	19 lb. 8 oz.
2½	D	2.75	5 lb.
	A	3.00	10 lb. 10 oz.
3	C	3.25	6 lb.
	A	3.50	12 lb. 8 oz.
4	C	4.25	7 lb. 14 oz.
	A	4.50	16 lb. 6 oz.
5	D	5.25	9 lb. 14 oz.
	B	5.50	20 lb. 4 oz.
6	Unclassified	6.25	11 lb. 13 oz.
	C	6.50	24 lb. 2 oz.

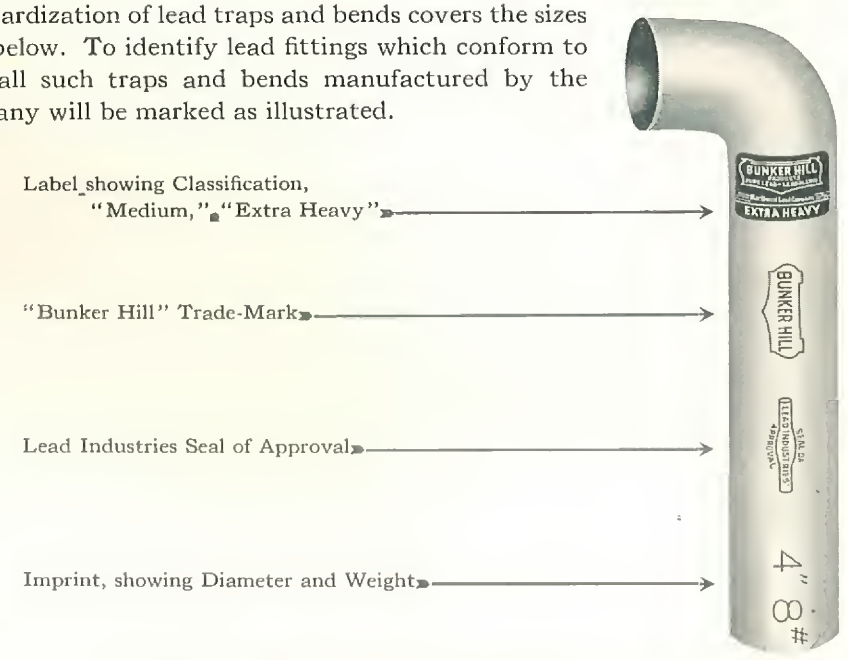
NOTE 2" D, as first listed above is always supplied, unless otherwise specified. While this does not conform with the Lead Industries' listing, and will not bear the Guild mark, it is set up as a convenience to the buyer wishing to order a 2" pipe for use with "Medium" weight fittings and is, at the same time, uniform with the recommended practice of using ⅛" wall as a minimum. If the heavier 2" D, as listed nationally by the Lead Industries Association is desired, the order should be marked "LIA", as shown below.

OTHER SIZES

Sizes—made to local specifications, but not within the limits of the national standards—will not bear the Lead Industries Association Seal of Approval. They will, however, show the Bunker Hill trade-mark, identifying them as quality products made for special purposes.

LOOK FOR THESE MARKINGS ON APPROVED LEAD TRAPS AND BENDS

The national standardization of lead traps and bends covers the sizes and weights tabulated below. To identify lead fittings which conform to this approved listing, all such traps and bends manufactured by the Northwest Lead Company will be marked as illustrated.



THE APPROVED SIZES

S TRAPS, (Short & Long)
P TRAPS, (Short & Long)
¾ S TRAPS, (Short & Long)
RUNNING TRAPS, (Short & Long)
RUNNING Y TRAPS, (Short & Long)
BAG TRAPS, (Short & Long)
LEAD BENDS, (Short & Long)

SIZE INSIDE DIAMETER INCHES	CLASSIFICATION	SIZE OUTSIDE DIAMETER INCHES	WEIGHT PER FT.	SIZE INSIDE DIAMETER INCHES	CLASSIFICATION	SIZE OUTSIDE DIAMETER INCHES	WEIGHT PER FT.
1¼	Medium	1.442	2 lb.	2	Medium	2.25	4 lb.
1¼	Ex. Heavy	1.486	2 lb. 8 oz.	2	Ex. Heavy	2.276	4 lb. 8 oz.
1½	Medium	1.74	3 lb.	3	Ex. Heavy	3.25	6 lb.
1½	Ex. Heavy	1.776	3 lb. 8 oz.	4	Ex. Heavy	4.25	8 lb.

THE BUNKER HILL LABEL— AN EXCLUSIVE IDENTIFYING MARK

For many years all Bunker Hill lead traps and bends have been labeled according to weight—"Standard," "Medium," etc. This exclusive feature will be continued, in addition to the above imprinting.

The label will also be used on lead fittings outside the approved listing which will not bear the Lead Industries insignia. While we do not recommend the use of the lighter fittings, we will continue to supply them where specified.

The Bunker Hill label—as always—will be your assurance of quality and workmanship wherever it appears.

NORTHWEST LEAD COMPANY

"BHB" Lead Bend

"BHB" Combination
Lead and Iron Ferrule.

"BHB" Combination
Bend and Ferrule.

BUNKER HILL LEAD FITTINGS

"BHB" Lead S Trap,
with Cleanout.

Only pure virgin lead is used in the manufacture of Bunker Hill Brand lead fittings. These products are hydraulically drawn and not cast. This insures an even wall thickness throughout all parts of the fitting, and a perfectly smooth interior.

All Bunker Hill lead fittings are labeled to indicate weight (Standard, Medium, Extra Heavy and Special Code), thus easily identifying the product on your shelf, or on the job.

"BHB" Lead Drum
Trap, with No. 5 Cover.

Extruding lead bends on hydraulic trap and bend machine in the Northwest Lead Company plant. The lead is forced, under great pressure, through dies—the operator's manipulation of valves determining the shape of the finished product.

The Manufacture of

BUNKER HILL LEAD FITTINGS

The production of lead traps and bends requires expert craftsmanship. The workmanship behind Bunker Hill lead fittings is that of men skilled in their trade, with many years' experience in the manufacture of these products.

Bunker Hill lead fittings are all made by extruding lead, under great pressure, through dies of accurate size. The pressure under which these are extruded produces a perfectly smooth interior, without burrs or lamination, and insures an absolute uniformity of wall thickness throughout the body, throat and heel of the fitting.

Bunker Hill lead fittings, being made of pure soft lead, are easy to work and simplify the wiping of joints in connecting to waste lines.

SPECIAL LEAD FITTINGS

Besides the plumber's lead fittings listed in the following pages, we make up to order many special sizes, shapes and weights of lead fittings. We also produce fittings of special lead alloys for industrial use, made to specification.

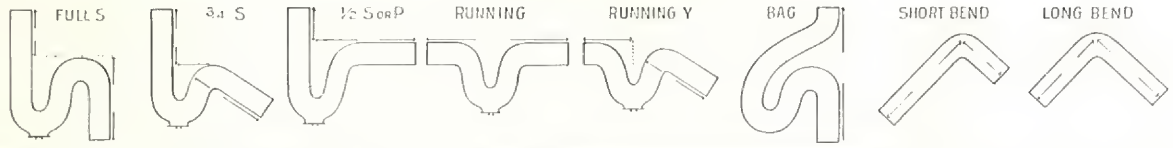
NATIONAL STANDARDIZATION

To eliminate confusion that has existed in various parts of the United States and to bring about a standardization in lead traps and bends throughout the nation, the Lead Industries Association has set up a listing of weights in these products, to which leading lead manufacturers will adhere in the future. Bunker Hill lead traps and bends conform in every particular to this new standardization.

DIMENSION SCALE FOR SHORT LEAD TRAPS AND BENDS

(Conforming with United States Standard Listings)

Showing method of determining measurements of lead traps and bends, as illustrated below. First five items indicate length of inlet and outlet; Bag traps, indicated by overall measurements; Bends, indicated by measurements from center to ends.



Size	Inlet Outlet Full S	Inlet Outlet ¾ S	Inlet Outlet ½ S or P	Inlet Outlet Running	Inlet Outlet Running Y	Length Over All Bag	Center to Ends Short Bend	Center to Ends Long Bend
1¼″	4¼″ 6¼″	4¼″ 5¼″	4½″ 6″	4½″ 5½″	4½″ 5¼″	11½″	6″ 3½″	6″
1½″	4½″ 7″	4½″ 6″	4½″ 7″	5¼″ 6¼″	5¼″ 6″	13″	7″ 4″	7″
2″	4½″ 8″	4½″ 7½″	4½″ 8″	5¼″ 7½″	5¼″ 7½″	15″	7¾″ 3¾″	7¾″
3″	4″ 10½″	4″ 10″	4″ 9½″	7½″ 7½″	7½″ 10″	18½″	8¼″ 4¼″	8¼″
4″	3¼″ 11½″	3¼″ 11″	3¼″ 10″	8″ 8″	8″ 11″	22½″	10″ 5½″	10″

DIMENSION SCALE FOR EXTRA LONG TRAPS

SHOWING LENGTH OVER ALL OF S AND BAG TRAPS, AND INLET AND OUTLET OF ¾ S, P, RUNNING AND RUNNING Y

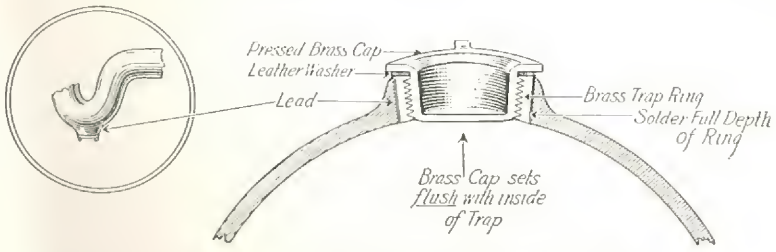
Size	Full S	¾ S		½ S or P		Running		Running Y		Bag
	Length Over All	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Length Over All
1¼″	24″	4¼″	16¼″	4¼″	14¼″	4½″	17½″	4½″	16¼″	24″
1½″	24″	4½″	15¾″	4½″	14″	5¼″	16¾″	5¼″	15¾″	24″
2″	24″	4¼″	15½″	4½″	14″	5¼″	16¾″	5¼″	15½″	24″

SPECIAL FEATURES OF BUNKER HILL TRAPS

Below is shown a cross-section diagram of a Bunker Hill Lead Trap at point where trap screw cleanout is provided.

Note that where the trap screw is inserted into the trap, the lead is built up to allow soldering the full depth of the ring. This is an exclusive feature of Bunker Hill Traps, insuring a tight, leak-proof joint.

The brass cleanout is made to our specifications. As shown in the diagram, it fits flush with the inside of the trap, permitting a smooth, clear flow of waste.



Cross Section of Bunker Hill Lead Trap,
Illustrating Special Trap Screw Cleanout Features.

BUNKER HILL DRAWN LEAD TRAPS

UNITED STATES STANDARD PRICE LIST

		Standard Weight					Medium Weight			Extra Heavy Weight				
Weight of Lead per Running Foot		1½ lbs.	2¼ lbs.	3¼ lbs.	5 lbs.	6 lbs.	2 lbs.	3 lbs.	4 lbs.	2½ lbs.	3½ lbs.	4½ lbs.	6 lbs.	8 lbs.
Shape	Style	1¼ in.	1½ in.	2 in.	3 in.	4 in.	1¼ in.	1½ in.	2 in.	1¼ in.	1½ in.	2 in.	3 in.	4 in.
S	Regular	.58	.90	1.38	2.69	3.25	.73	1.03	1.65	.87	1.25	1.85	3.09	4.30
S	Ex. Long	.93	1.36	2.00	.....	.....	1.19	1.64	2.40	1.44	1.95	2.69	.....	.....
¾ S	Regular	.55	.81	1.30	2.62	3.07	.66	.94	1.53	.81	1.15	1.73	2.97	3.95
¾ S	Ex. Long	.85	1.19	1.76	.....	.....	1.04	1.43	2.08	1.28	1.72	2.33	.....	.....
P	Regular	.51	.75	1.20	2.24	2.49	.64	.87	1.42	.77	1.09	1.57	2.58	3.25
P	Ex. Long	.76	1.02	1.55	.....	.....	.95	1.22	1.83	1.14	1.50	2.02	.....	.....
Running	Regular	.48	.72	1.13	2.09	2.53	.58	.87	1.32	.70	1.03	1.46	2.35	3.28
Running	Ex. Long	.82	1.15	1.67	.....	.....	1.01	1.41	1.98	1.23	1.65	2.18	.....	.....
Running Y	Regular	.52	.76	1.34	2.46	3.15	.65	.94	1.45	.74	1.09	1.61	2.88	4.05
Running Y	Ex. Long	.83	1.15	1.82	.....	.....	1.05	1.45	2.01	1.23	1.52	2.23	.....	.....
Bag	Regular	.68	1.08	1.73	3.35	4.77	.87	1.28	2.08	1.06	1.54	2.33	3.96	6.30
Bag	Ex. Long	1.09	1.58	2.34	.....	.....	1.38	1.91	2.80	1.67	2.24	3.11	.....	.....
On lengths not listed add for each inch		.03¼	.04½	.06¼	.10¾	.12	.04¼	.06	.07¾	.05	.07	.08½	.12	.15

Prices include Brass Drain Screws on all sizes except 3 in. and 4 in.

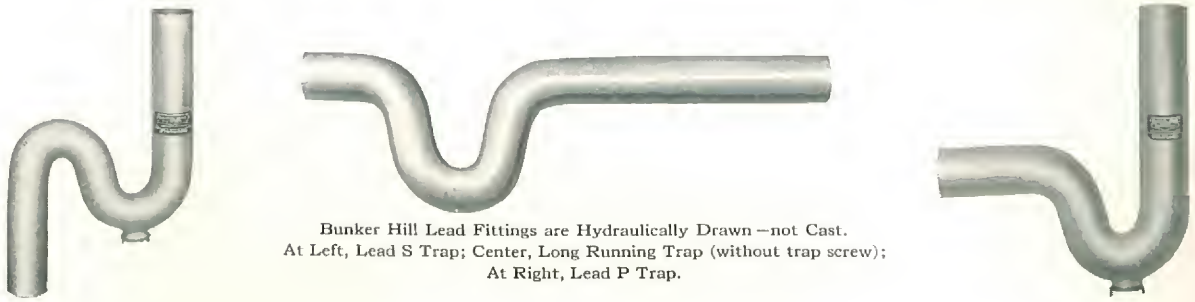
Standard Long Inlet Traps Take Same Price List as Long Outlet Traps.

VENTED LEAD TRAPS

We also supply lead traps with vent connections, according to specifications. State whether rough brass, finished brass, or nickel-plated connections are desired.

STOCK PACKAGE LIST OF TRAPS

Trap Size	No. in Barrel	Trap Size	No. in Barrel	Trap Size	No. in Barrel
1¼″ Short S	40	1½″ Short S	40	2″ Short S	24
1¼″ Short P	40	1½″ Short P	40	2″ Short P	24
1¼″ Long S	24	1½″ Long S	24	2″ Long S	20
1¼″ Long P	24	1½″ Long P	24	2″ Long P	24



Bunker Hill Lead Fittings are Hydraulically Drawn—not Cast.
At Left, Lead S Trap; Center, Long Running Trap (without trap screw);
At Right, Lead P Trap.

BUNKER HILL DRAWN LEAD BENDS

UNITED STATES STANDARD PRICE LIST

Weight of Lead per Running Foot	Standard Weight					Medium Weight			Extra Heavy Weight				
	1½ lbs.	2¼ lbs.	3¼ lbs.	5 lbs.	6 lbs.	2 lbs.	3 lbs.	4 lbs.	2½ lbs.	3½ lbs.	4½ lbs.	6 lbs.	8 lbs.
Size	1¼ in.	1½ in.	2 in.	3 in.	4 in.	1¼ in.	1½ in.	2 in.	1¼ in.	1½ in.	2 in.	3 in.	4 in.
Short Bend	.25	.38	.57	1.09	1.50	.31	.51	.69	.34	.62	.80	1.21	1.84
Long Bend	.30	.50	.78	1.39	1.95	.41	.66	1.00	.50	.79	1.05	1.60	2.40
Short Inlet Extension Bends—12-in. Outlet	.40	.56	.79	1.39	1.70	.52	.75	.99	.60	.90	1.08	1.57	2.09
15-in. Outlet	.47	.67	.94	1.65	2.00	.62	.89	1.17	.72	1.07	1.28	1.87	2.45
18-in. Outlet	.55	.77	1.09	1.90	2.30	.72	1.03	1.36	.84	1.24	1.49	2.16	2.81
20-in. Outlet	.60	.84	1.19	2.07	2.48	.79	1.12	1.49	.92	1.35	1.63	2.35	3.04
Long Inlet Extension Bends—12-in. Outlet	.46	.67	.99	1.73	2.15	.60	.89	1.24	.70	1.07	1.35	1.96	2.62
15-in. Outlet	.54	.77	1.14	1.99	2.44	.70	1.03	1.42	.82	1.24	1.56	2.25	2.98
18-in. Outlet	.62	.88	1.29	2.24	2.73	.80	1.17	1.61	.94	1.41	1.76	2.54	3.34
20-in. Outlet	.67	.95	1.39	2.42	2.92	.87	1.26	1.74	1.02	1.52	1.90	2.74	3.58
On lengths not listed add for each inch	.03¼	.04½	.06¼	.10¾	.12	.04¼	.06	.07¾	.05	.07	.08½	.12	.15

Closed-end Bends for Testing Purposes, add 70c to above list.

BUNKER HILL EXPANDED LEAD BENDS

Made of 6 Lb. Lead.

3 x 4 x 5½ x 10	1.72
3 x 4 x 5½ x 12	2.02
3 x 4 x 5½ x 15	2.32
3 x 4 x 5½ x 18	2.61
3 x 4 x 5½ x 20	2.79

STOCK PACKAGES OF BUNKER HILL BENDS

4-in Bends	No. in Barrel
4x5x1¼10	16
4x5x1½12	15
4x5½x15	12
4x5½x18	8
4x5½x20	8
4x10x10	10
4x10x12	10
4x10x15	8
4x10x18	8
4x10x20	6
4x12x12	8
3-in. Bends	
3x4¼x8¼	24
3x4¼x10	24
3x4¼x12	20
3x4¼x15	18
3x4¼x18	15
3x8¼x8¼	16

3-in. Bends	No. in Barrel
3x8¼x12	12
3x8¼x15	10
3x8¼x18	10
3x8¼x20	8
1½-in. Bends	
1½x4x7	100
1½x7x7	75
1½x4½x10	50
1½x4½x12	50
1½x4½x15	50
1½x4½x18	40
1½x4½x20	40
Expanded Bends	
3x4x5½x10	20
3x4x5½x12	18
3x4x5½x15	15
3x4x5½x18	12

Note: Listings cover standard, medium, and extra heavy weights.

Number per package of sizes not shown, furnished on request.

COMBINATION LEAD BENDS AND IRON FERRULES

(Known as B H B Combination Bends)

UNITED STATES STANDARD PRICE LIST

	Standard Weight								
Length of Outlet End—Short Extension	8 in.	10 in.	12 in.	14 in.	16 in.	18 in.	20 in.	22 in.	24 in.
1¼ in. for 2 in. Cast Iron Pipe	.82	.86	.90	.97	1.03	1.10	1.16	1.23	1.30
1½ in. for 2 in. Cast Iron Pipe	.88	.97	1.06	1.15	1.24	1.33	1.42	1.51	1.60
2 in. for 2 in. Cast Iron Pipe	1.10	1.20	1.29	1.41	1.53	1.65	1.77	1.89	2.01
3 in. for 3 in. Cast Iron Pipe	1.60	1.75	1.89	2.06	2.23	2.40	2.57	2.74	2.91
4 in. for 4 in. Cast Iron Pipe	1.90	2.00	2.20	2.40	2.60	2.80	3.00	3.20	3.40
Length of Outlet End—Long Extension	8 in.	10 in.	12 in.	14 in.	16 in.	18 in.	20 in.	22 in.	24 in.
1¼ in. for 2 in. Cast Iron Pipe	.85	.90	.96	1.03	1.09	1.16	1.22	1.29	1.35
1½ in. for 2 in. Cast Iron Pipe	1.00	1.08	1.17	1.26	1.35	1.44	1.53	1.62	1.71
2 in. for 2 in. Cast Iron Pipe	1.30	1.40	1.49	1.61	1.73	1.85	1.97	2.09	2.21
3 in. for 3 in. Cast Iron Pipe	2.00	2.10	2.23	2.40	2.57	2.74	2.91	3.08	3.25
4 in. for 4 in. Cast Iron Pipe	2.25	2.45	2.65	2.85	3.04	3.23	3.42	3.62	3.82

	Medium Weight								
Length of Outlet End—Short Extension	8 in.	10 in.	12 in.	14 in.	16 in.	18 in.	20 in.	22 in.	24 in.
1¼ in. for 2 in. Cast Iron Pipe	.90	.96	1.02	1.10	1.19	1.27	1.36	1.44	1.53
1½ in. for 2 in. Cast Iron Pipe	1.07	1.15	1.25	1.37	1.49	1.61	1.73	1.85	1.97
2 in. for 2 in. Cast Iron Pipe	1.20	1.35	1.50	1.65	1.80	1.95	2.10	2.25	2.40
Length of Outlet End—Long Extension	8 in.	10 in.	12 in.	14 in.	16 in.	18 in.	20 in.	22 in.	24 in.
1¼ in. for 2 in. Cast Iron Pipe	1.00	1.05	1.10	1.19	1.27	1.36	1.44	1.53	1.61
1½ in. for 2 in. Cast Iron Pipe	1.20	1.30	1.39	1.51	1.63	1.75	1.87	1.99	2.11
2 in. for 2 in. Cast Iron Pipe	1.50	1.60	1.74	1.89	2.04	2.19	2.34	2.49	2.64

	Extra Heavy Weight								
Length of Outlet End—Short Extension	8 in.	10 in.	12 in.	14 in.	16 in.	18 in.	20 in.	22 in.	24 in.
1¼ in. for 2 in. Cast Iron Pipe	.95	1.00	1.10	1.20	1.30	1.40	1.50	1.60	1.70
1½ in. for 2 in. Cast Iron Pipe	1.20	1.30	1.40	1.54	1.68	1.82	1.96	2.10	2.24
2 in. for 2 in. Cast Iron Pipe	1.35	1.45	1.58	1.75	1.92	2.09	2.26	2.43	2.60
3 in. for 3 in. Cast Iron Pipe	1.71	1.86	2.07	2.28	2.49	2.70	2.91	3.13	3.34
4 in. for 4 in. Cast Iron Pipe	2.29	2.44	2.59	2.83	3.07	3.31	3.54	3.78	4.02
Length of Outlet End—Long Extension	8 in.	10 in.	12 in.	14 in.	16 in.	18 in.	20 in.	22 in.	24 in.
1¼ in. for 2 in. Cast Iron Pipe	1.00	1.10	1.20	1.30	1.40	1.50	1.60	1.70	1.80
1½ in. for 2 in. Cast Iron Pipe	1.35	1.45	1.57	1.71	1.85	1.99	2.13	2.27	2.41
2 in. for 2 in. Cast Iron Pipe	1.65	1.70	1.85	2.02	2.19	2.36	2.53	2.70	2.87
3 in. for 3 in. Cast Iron Pipe	2.15	2.25	2.46	2.67	2.88	3.09	3.30	3.51	3.72
4 in. for 4 in. Cast Iron Pipe	2.64	2.88	3.12	3.36	3.60	3.84	4.08	4.32	4.56

Closed-End Combination Bends and Ferrules for Testing Purposes—Add 70c to Above List.

STOCK PACKAGES

The stock package list of Bunker Hill Combination Bends corresponds to the listing shown for regular Bunker Hill Lead Bends on page twenty-seven.

WEIGHT PER FOOT

The weight of lead per foot used in Bunker Hill Combination Bends is identical with Standard, Medium and Extra Heavy weights listed for regular Lead Bends on page twenty-seven.

BUNKER HILL COMBINATION (LEAD AND IRON) FERRULES

(Known as B H B Ferrules)

UNITED STATES STANDARD PRICE LIST

Standard Weight	Length—In Inches													
	4	4½	5	6	8	10	12	14	16	18	20	24	30	36
1¼ in. for 2 in. Cast Iron Pipe	.....	.28	.36	.43	.51	.60	.67	.....	.....	.....	.....	.....	.....	.....
1½ in. for 2 in. Cast Iron Pipe	.....	.28	.36	.43	.51	.60	.67	.80	.90	1.00	1.10	1.30	.....	.....
2 in. for 2 in. Cast Iron Pipe	.28	.....	.41	.46	.57	.67	.76	.80	.86	.92	1.00	1.15	1.40	1.65
3 in. for 3 in. Cast Iron Pipe	.42	.....	.60	.67	.82	.98	1.10	1.15	1.22	1.30	1.40	1.60	2.00	2.30
4 in. for 4 in. Cast Iron Pipe	.50	.....	.72	.85	1.02	1.25	1.40	1.60	1.73	1.85	2.10	2.30	2.75	3.25
Extra Heavy Weight														
1½ in. for 2 in. Cast Iron Pipe	.....	.38	.44	.52	.61	.72	.80	1.15	1.30	1.45	1.60	1.90	.....	.....
2 in. for 2 in. Cast Iron Pipe	.42	.....	.49	.54	.67	.81	.93	1.10	1.23	1.36	1.49	1.75	2.20	2.60
3 in. for 3 in. Cast Iron Pipe	.55	.....	.75	.84	1.00	1.18	1.35	1.46	1.63	1.80	1.97	2.33	2.90	3.40
4 in. for 4 in. Cast Iron Pipe	.70	.....	.84	.94	1.23	1.45	1.67	2.00	2.21	2.45	2.70	3.16	3.76	4.36

Closed-End "B-H-B" Ferrules for Testing Purposes—Add 70c to Above List.

ACCESSORIES

UNITED STATES STANDARD PRICE LIST

	Diameter				
	1¼ in.	1½ in.	2 in.	3 in.	4 in.
Iron Ferrules	.....	.....	.15	.20	.25
Brass Ferrules	.....	.....	.38	.70	1.00

WEIGHTS

Size	1¼	1½	2	3	4
Standard Weight—Weight in lbs. per running foot	1 7/10	2¼	3¼	5	6
Extra Heavy Weight—Weight in lbs. per running foot	2½	3½	4½	6	8

STOCK PACKAGES OF 4-INCH COMBINATION FERRULES

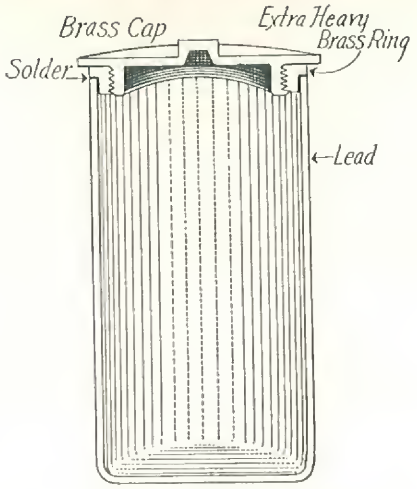
Size	No. in Barrel	Size	No. in Barrel
4x6	24	4x14	12
4x8	24	4x16	12
4x10	24	4x18	12
4x12	24	4x20	12

"RAYMOND" FITTINGS

Combination lead and iron ferrules, as well as combination lead bends and iron ferrules, are sometimes referred to as "Raymond" ferrules and "Raymond" bends, respectively. These items correspond to our above listings.

BUNKER HILL LEAD DRUM TRAPS

Bunker Hill Drum Traps are made of hydraulically drawn, seamless lead, with bottoms "spun" to shape.



Cross Section of Bunker Hill Lead Drum Trap

Bunker Hill Drum Traps are labeled to indicate Standard, Medium or Extra-Heavy Weights.

MANUFACTURE

Bunker Hill Lead Drum Traps are made of drawn lead, which, after extruding to length, is spun closed to make a seamless end. Our method of manufacturing insures a consistently uniform wall thickness throughout the entire trap and an absolutely smooth interior.

RING AND COVER FEATURES

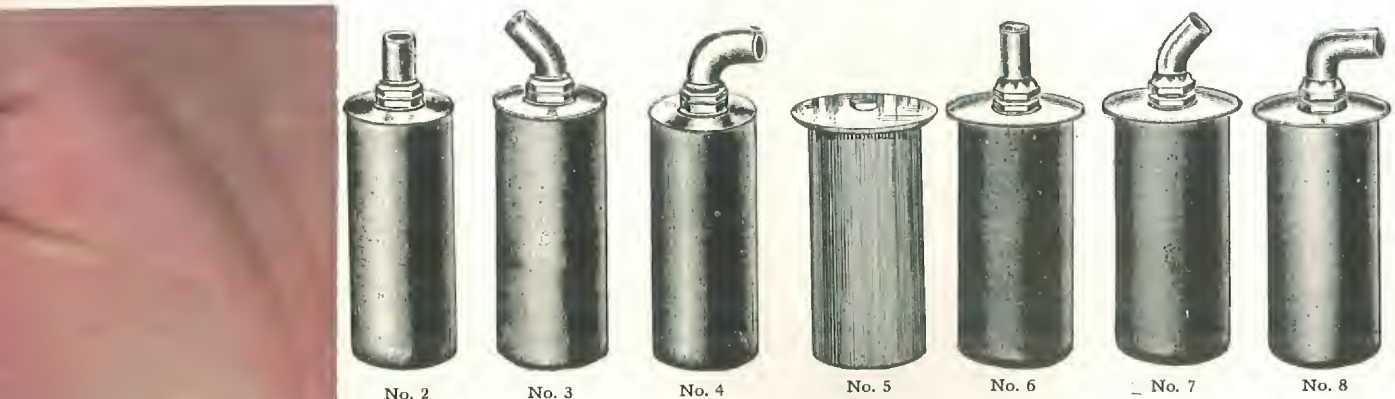
As illustrated above, our Drum Traps are provided with an extra-heavy deep brass ring, strongly built into the body of the fitting.

Only first-quality brass is used in our Drum Trap covers—made to our specification. These are supplied in plain brass, polished brass, nickel-plated and chromium-plated finishes.

In ordering specify by number the style of cover, and state finish desired.

SPECIAL SIZES

Lead Drum Traps, in weights and sizes not shown herein, also made up to order.



No. 2 No. 3 No. 4 No. 5 No. 6 No. 7 No. 8

U. S. STANDARD PRICE LIST OF LEAD DRUM TRAPS

"B-H-B" Drum Traps Complete Screws Ordinary Finish	Regular Pattern						
	No. 1	No. 2	Nos. 3 & 4	No. 5	No. 6	Nos. 7 & 8	"Blank" Without Screws
4x 8 Standard Weight.....Each	$1.90	$2.60	$3.00	$2.00	$2.80	$3.20	$ .90
4x 9 " " "	2.02	2.72	3.12	2.12	2.92	3.32	1.02
4x10 " " "	2.10	2.80	3.20	2.20	3.00	3.40	1.10
4x11 " " "	2.18	2.88	3.28	2.28	3.08	3.48	1.18
4x12 " " "	2.25	2.95	3.35	2.35	3.15	3.55	1.25
4x14 " " "	2.55	3.25	3.65	2.65	3.45	3.85	1.55
4x 8 Medium Weight.....Each	2.05	2.75	3.15	2.15	2.95	3.35	1.05
4x 9 " " "	2.18	2.88	3.28	2.28	3.08	3.48	1.18
4x10 " " "	2.27	2.97	3.37	2.37	3.17	3.57	1.27
4x11 " " "	2.37	3.07	3.47	2.47	3.27	3.67	1.37
4x12 " " "	2.45	3.15	3.55	2.55	3.35	3.75	1.45
4x14 " " "	2.75	3.45	3.85	2.85	3.65	4.05	1.75
4x 8 Extra Heavy Weight.....Each	2.40	3.10	3.50	2.50	3.30	3.70	1.40
4x 9 " " "	2.50	3.20	3.60	2.60	3.40	3.80	1.50
4x10 " " "	2.63	3.33	3.73	2.73	3.53	3.93	1.63
4x11 " " "	2.75	3.45	3.85	2.85	3.65	4.05	1.75
4x12 " " "	2.90	3.60	4.00	3.00	3.80	4.20	1.90
4x14 " " "	3.30	4.00	4.40	3.40	4.20	4.60	2.30
For Polished Brass, Nickel-plated or Chromium plated, add to list...Each	.20	.30	.30	.20	.30	.30	....

STOCK PACKAGE LIST OF BUNKER HILL DRUM TRAPS

Size	No. in Barrel
4x 8	24
4x10	24
4x11	24
4x12	24
4x14	12

Above List Applies to Standard, Medium and Extra Heavy Weights.

DRUM TRAP ACCESSORIES

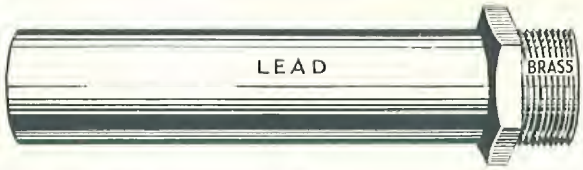
	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8
Drum Trap Screws—Ordinary Finish.....Each	1.00	1.70	2.10	2.10	1.10	1.90	2.30	2.30
Drum Trap Screws—Nickel or Chromium Plated Each	1.20	2.00	2.40	2.40	1.30	2.20	2.60	2.60

WEIGHT OF LEAD USED IN MANUFACTURE OF "BHB" DRUM TRAPS

4-inch Standard Weight.....equals Lead Waste Pipe weighing 5 lbs. per running foot.
4-inch Medium Weight.....equals Lead Waste Pipe weighing 6 lbs. per running foot.
4-inch Extra Heavy Weight.....equals Lead Waste Pipe weighing 8 lbs. per running foot.

BHB COMBINATION SOLDERING NIPPLES

(LEAD AND BRASS)



Size	Length (Inches)						
	4	6	8	10	12	14	20
1¼″ Standard (2 lbs. per Ft.)	$0.39	$0.44	$0.52	$0.58	$0.63	$0.73	$0.90
1½″ Standard (3 lbs. per Ft.	.48	.60	.66	.74	.80	.93	1.15
2″ Standard (4 lbs. per Ft.)	.72	.86	.96	1.08	1.17	1.37	1.68
3″ Standard (4¾ lbs. per Ft.)	1.26	1.50	1.67	1.86	2.00	2.27	2.70
4″ Standard (6 lbs. per Ft.)	1.63	1.95	2.13	2.36	2.53	2.93	3.45
1¼″ Extra-Heavy (2½ lbs. per Ft.)	.41	.48	.56	.64	.71	.79	1.00
1½″ Extra-Heavy (3½ lbs. per Ft.)	.51	.60	.71	.82	.92	1.04	1.34
2″ Extra-Heavy (4½ lbs. per Ft.)	.79	.90	1.04	1.18	1.31	1.47	1.85
4″ Extra-Heavy (8 lbs. per Ft.)	1.70	2.15	2.35	2.55	2.75	3.15	3.75

These are made of drawn Bunker Hill lead, soldered to Brass Stub, as illustrated above. Also made with wiped joints, prices on which will be given on application.

BHB COMBINATION LEAD & BRASS FERRULES and BHB COMBINATION LEAD BENDS and BRASS FERRULES

Both items furnished in all common sizes. Made of drawn, seamless lead. Connections to brass ferrule are with wiped joint, assuring a strong union between the two metals.

Both items supplied in standard, extra-heavy and special weight. Prices on application.

(Note: In ordering combination lead and brass fittings, specify inside diameter and length overall, as allowance must be made for extension of brass ferrule beyond wiped joint.)

BHB Combination Lead & Brass "Double Enders"

In some localities the plumbing trade has found it convenient to purchase Bunker Hill lead and brass ferrules in the form of "Double-Enders" as illustrated. These are supplied in any diameter and length desired and cut to size as required, in the shop or on the job. In ordering specify inside diameter and length overall.

Prices on Application.

NORTHWEST LEAD COMPANY

BUNKER HILL FISHING and SHIP CHANDLER'S SUPPLIES

SEINE LEADS

(Closed)

Our closed seines are made of cast lead — accurate in size and weight. A favorite with the fishing trade, because of the perfectly round hole and smooth interior. Furnished in the following sizes:

Weight	Hole Size
1½ oz.	3/8"
4 oz.	7/16"
4 oz.	1/2"
4 oz.	5/8"
6 oz.	5/8"

Specify weight and hole size when ordering.

OPEN END SEINES

Sometimes referred to as "Gill Net Leads". Edges are beveled, to facilitate placing on the line. Made of soft Bunker Hill Lead, they are easily formed over the rope to make a smooth, round weight. Order by number, as listed below:

Number	Weight	Opening	Length
1	1 oz.	1/4"	1¼ in.
2	1½ oz.	1/4"	1⅝ in.
3	2½ oz.	5/16"	1¾ in.
4	2½ oz.	5/16"	2¼ in.
5	4 oz.	3/8"	2½ in.

LEAD BANK SINKERS

A Bunker Hill Lead Sinker made for rod fishing, throw lines, etc. All sizes are made in hexagonal shape, as illustrated. Made of cast lead, with smooth finish. Order by weight.

Standard Sizes

1 oz.	6 oz.	14 oz.
2 oz.	8 oz.	16 oz.
3 oz.	10 oz.	24 oz.
4 oz.	12 oz.	32 oz.

BUNKER HILL PRODUCTS
PURE LEAD - LEAD ALLOYS

LEAD MAST COATING
RIBBON LEAD ❖ STEP LEAD

Supplied on spools of approximately one hundred pounds each, or made to special length, as required. A complete listing of lead mast coating (ribbon lead) sizes is shown on page eleven.

These widths are also supplied in hard lead alloy, cut to specified length, for step lead work.

COLUMBIA RIVER

(Swivel Type)

LEAD SINKERS

These Bunker Hill Trolling Leads, in the following sizes, are all cast with brass rod centers. One end carries brass ring, with brass swivel at other end.

2 lb.	7 lb.
3 lb.	8 lb.
4 lb.	10 lb.
5 lb.	12 lb.
6 lb.	15 lb.

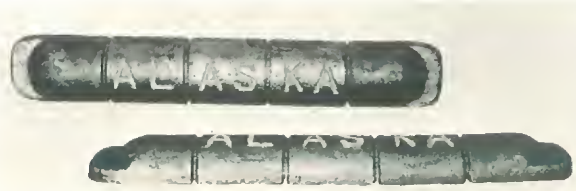
BUNKER HILL TROLLING LEADS

(Alaska Type)

Ten 10-pound trolling leads cast together to form a hundred-pound unit. Convenient for handling and easy to break off as required.

Soft Bunker Hill Lead used in the casting of this material.

ALASKA TYPE PIG LEAD



Pig Lead scored in five twenty-pound sections, which simplifies cutting off as needed. This is made of regular Bunker Hill Pig Lead, but in special thin bars to facilitate cutting.

BUNKER HILL HAND SOUNDING LEADS

Bunker Hill Sounding Leads have been used in survey work and by the general marine trade for many years. Hexagonal in shape—tapered from top to bottom. Furnished with eye at small end and ribbed recess of ample depth at other.

Weight	Length
2 lb.	3 5/8"
3 lb.	4 1/2"
4 lb.	5 3/8"
5 lb.	6 1/8"
6 lb.	6 7/8"
7 lb.	7 3/4"
8 lb.	8 1/2"

Weight	Length
9 lb.	9 1/8"
10 lb.	9 3/4"
12 lb.	11 1/4"
14 lb.	12 5/8"
15 lb.	13 1/4"
16 lb.	14"
18 lb.	15 1/4"

Weight	Length
20 lb.	16 1/4"
25 lb.	18 1/2"
30 lb.	20 1/4"
35 lb.	22 1/2"
40 lb.	24 7/8"
45 lb.	26 7/8"
50 lb.	28 3/4"

BUNKER HILL ROD SOUNDING LEADS

Sometimes referred to as "Machine Sounding Leads." Supplied with half-inch diameter steel rod having one and three-eighth inch eye, as illustrated. The rod sounding leads, as well as the hand leads listed above, all come with ribbed recess at bottom one and one-half inch in depth—the hole diameter varying from one and seventh-eighth inch to two and three-quarter inch, according to weight of the lead.

Rod Sounding Leads are furnished in the following weights:

Weight	Length (Overall)
25 lb.	35 1/2"
30 lb.	37 3/4"
35 lb.	40"
40 lb.	42 3/8"
45 lb.	44 3/8"
50 lb.	46 1/4"

Note: Weight includes both lead and steel rod.
Overall length includes 17 1/2 in. from lead to end of rod.

LEAD DRAFT FIGURES

Bunker Hill Lead Draft Figures, from 1 to 0, inclusive, are carried in stock. These are all six inches in height.

Shapes are true with smooth surface. Carried in one style only, as illustrated.

LEAD SHAFT LOG LININGS

A few ships in which Bunker Hill Shaft Log Linings have been installed. The two vessels which show lead sleeves being placed are ocean-going—the other two are inland ferries.

Lead is rust-proof and of all common metals is least affected by contact with salt water. It is easy to install and provides a snug, watertight lining for shaft logpurposes. Bunker Hill Lead Linings are now giving service on many ships operating out of Pacific Coast ports.

Insert over bottom illustration shows a typical Bunker Hill lead sleeve, about twenty-five feet in length, belled at one end. Workman demonstrates ease of working with lead linings, by use of ordinary hand saw to cut the metal where propeller bearings fit in.

BUNKER HILL LININGS

We supply lead sleeves for shaft log work in all sizes and lengths. Linings up to twelve inch I. D. are furnished without seams. Larger than twelve inch are made with lead-burned seam, which makes a strong smooth joint.

Also supplied with belled (or hubbed) end, made to specifications.

The purity and softness of Bunker Hill lead, from which our lead sleeves are made, are valuable qualities in making shaft log linings that are easy to expand, that provide a tight, waterproof bond to the log, and that will satisfactorily resist the corrosive action of sea water.

BUNKER HILL SHEET LEAD AND LEAD PIPE

Our Sheet Lead is made from pure Bunker Hill Lead and produced under manufacturing methods which insure a perfect product. This is supplied in full standard size rolls, or in pieces of special weight and dimensions, according to your requirements. For full details of Bunker Hill Sheet Lead see data commencing on page seven.

Bunker Hill Lead Pipe is also produced from the same pure lead, or made in alloys as specified. Our pipe is guaranteed to be true to size, of uniform wall thickness, and because of its purity will be found free from "blisters", pitting, or rough surface. For listing of standard and special sizes see data commencing on page thirteen.

MARINE SPECIALTIES

REFRIGERATOR ROOM LININGS

It is common practice to line ship refrigerator room floors with lead. Due to varying temperatures in such rooms there is constant contraction and expansion encountered, which tears rigid linings loose at joints. Lead is commonly used for this work because, being soft and flexible, it withstands this movement without cracking or splitting and because it withstands most successfully the attacks of water condensation and the chemical action of salt water and salt-laden air.

The high quality of Bunker Hill Pure Sheet Lead makes it particularly adaptable to this work.

LEAD PANS FOR SHIP WORK

On board ship there are many places where a metallic lining, or moisture-proof pan is required. Almost without exception pans and linings for such purposes will give better service when made of lead. The ease of shaping to form, the non-corrosive quality of the metal, and its flexibility after installation, are features which make lead ideal for this purpose. We suggest the use of Bunker Hill Sheet Lead in making pans for toilet and shower room floors, battery boxes, oil drip pans, refrigerator room floors, pantries and galleys, sink linings, store cupboards, lamp lockers, etc.

SPECIAL LEAD FITTINGS

In marine plumbing work and the water circulating systems of ships, pipe fittings of special size and shape are often required. Naval architects and shipbuilders usually specify lead for these fittings, due to economy of fabricating, ease of installing, and the long life of the metal under marine requirements. We are regular suppliers of Bunker Hill Special Lead Fittings, such as Y's, ells, outlet-connections, reducers, multiple-connection units, etc., for ship work.

Requests for estimates on special fittings should be accompanied by sketch or template.

LEAD KEELS AND BALLAST

We are suppliers of cast lead and lead-covered keels for small ship work, or can supply you with lead in pig, bar, or sheet form for your own fabrication. Also suppliers of special-shaped lead ingots for ballast purposes.

USE OF LEAD IN GENERAL MARINE WORK

Lead has always had a wide usage wherever contact with salt water is encountered, due to its high corrosion-resistance.

The flexibility of lead is also of value in marine work, where in addition to requiring a metal to withstand corrosion, it is essential to offset the strain that is placed on piping, linings, etc., encountered in the "working" of a ship when at sea. The flexibility of lead not only protects itself from damage under such strains, but also safeguards plumbing fixtures and operating equipment with which it is used.

We will be glad to work with you in figuring your lead requirements for general marine work of all kinds.

TABULATION OF RESULTS OF ATMOSPHERIC AND SALT WATER EXPOSURE TESTS ON VARIOUS METALS

The following table is reproduced from a paper of the Institute of Metals, London, entitled, "The Relative Corrodibilities of Ferrous and Non-Ferrous Metals and Alloys."

Specimens used were cylindrical bars two feet long and one and one-eighth inch in diameter. The tabulations indicate the results of two tests carried on independently of each other—the next-to-last column of figures listing the findings of the atmospheric tests and the last column of figures covering the sea-water tests. The relative percentage losses shown in these two columns reveals that antimonial lead and soft lead stand first and third respectively in the atmospheric corrosion tests and fourth and fifth in the sea-water tests, being only exceeded by tin and nickel, much more expensive metals.

SUMMARY OF RESULTS OF EXAMINATIONS OF THE BARS EXPOSED TO CITY AIR AT BIRMINGHAM FOR SEVEN YEARS, 1922–1929

Metal	Composition* Per cent.	Surface Condition Prior to Exposure	Original Weight Grm.	Loss in Weight Grm.	Loss as Per cent of Original Weight	Relative Percentage Losses†	Relative Per cent. Losses in Sea Tests at Weston‡	Remarks
Copper, "arsenic free"	As 0.01	Polished	3526.4	8.1	0.230	58	...	Green stain under black coat; tenaciously adherent.
Copper, ordinary	As 0.10	Polished	3536.9	6.5	0.184	47	73	
Copper, arsenical	As 0.25	Polished	3535.6	5.9	0.167	42	...	
Copper, arsenical	As 0.43	Polished	3481.2	7.7	0.221	56	...	Metal surface in excellent condition.
Copper, arsenical	As 0.45	Polished	3502.9	6.3	0.180	46	68	
Nickel-copper	Ni 1.75	Polished	3508.9	6.6	0.188	48	61	
Nergandin brass	...	Polished	3373.5	13.3	0.394	*100*	*100*	Closely adherent red stain underneath black layer.
Naval brass	...	Polished	3305.5	11.4	0.345	88	112	
Muntz metal	...	Polished	3314.1	12.4	0.374	95	57	Metal surface in excellent condition.
Screw metal	Pb 1.37	Polished	3311.2	11.7	0.353	90	29	
Aluminum	Si 0.25 Fe 0.32	Polished	1057.7	1.2	0.113	29	89	White deposit under black coating; tenaciously adherent.
Lead, soft	Pb 99.96	Polished	4394.3	3.8	0.086	22	13	Perfect.
Lead antimonial	Sb 1.6	Polished	4375.7	0.5	0.011	3	10	Perfect
Nickel	...	Polished	3552.5	16.8	0.473	120	9	Greenish underneath black layer. Incipient pitting.
Tin, English common ingot	Sn 99.2	As cast	2793.3	2.8	0.100	25	1	Closely aherent; white deposit under black coating.
Tin, high-grade, pure	Sn 99.75	As cast	2855.5	2.0	0.070	18	2	
Zinc	Zn 99.82	Polished	2819.4	15.2	0.539	137	94	Small pinhole pitting.
Wrought iron (mean of 11–12 bars)	...	As rolled, with scale	e. 3000	201.2	6.71	1703	*100*	Surfaces roughened and slightly pitted.
Mild steel (mean of 7 bars)	...	As rolled, with scale	c. 3000	308.5	10.28	2609	112	Surfaces roughened and slightly pitted.
Stainless steel (mean of 3 bars)	Cr 12-13	Polished	c. 3000	3.0	0.10	25	49	Excellent condition.

*For full analyses, see J. Inst. Metals, 1928, 39, 115, Table I. †Taking nergandin brass as standard since it lost the same percentage amount in weight as the wrought irons taken as standard in the sea-action tests at Weston. ‡Calculated from data in Table III, J. Inst. Metals, 1928, 39, 122.

NORTHWEST LEAD COMPANY

BUNKER HILL BRAND LEAD WASHERS

No. 8 LEAD ROOFING WASHERS

A lead washer made especially for the roofing trade. Used particularly under nail heads on steel roofing, to prevent moisture penetration in nail holes and to seal the break in galvanized coating, eliminating rust and corrosion at that point.

Packed in five-pound cartons—twenty cartons per box.

Detailed dimensions of No. 8 Lead Roofing Washers are shown in the first listing below.

STANDARD BUNKER HILL LEAD WASHER SIZES

(These items are usually carried in stock.)

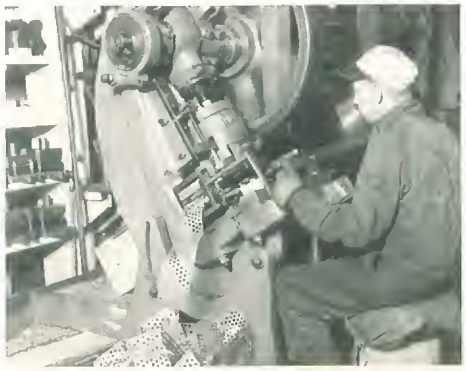
Designation	Style	Inside Diameter	Outside Diameter	Thickness	Approx. Number Per Pound
No. 8	Concave	$\frac{9}{64}$″	$\frac{1}{2}$″	$\frac{1}{16}$″	260
No. 10	Concave	$\frac{3}{16}$″	$\frac{3}{4}$″	$\frac{1}{16}$″	95
No. 13	Flat	$\frac{1}{4}$″	$\frac{3}{4}$″	$\frac{1}{16}$″	85
No. 14	Concave	$\frac{1}{4}$″	$\frac{7}{8}$″	$\frac{1}{16}$″	65
No. 15	Flat	$\frac{1}{4}$″	$\frac{7}{8}$″	$\frac{1}{16}$″	65
No. 16	Concave	$\frac{1}{4}$″	1″	$\frac{1}{16}$″	45
No. 18	Concave	$\frac{5}{16}$″	$\frac{7}{8}$″	$\frac{1}{16}$″	75
No. 20	Concave	$\frac{3}{8}$″	$\frac{7}{8}$″	$\frac{1}{16}$″	80
No. 23	Flat	$\frac{21}{32}$″	$1\frac{1}{4}$″	$\frac{1}{16}$″	30
No. 25	Concave	$1\frac{1}{32}$″	$1\frac{13}{16}$″	$\frac{3}{32}$″	15

NOTE: *Thicknesses shown on above sizes are the ones most commonly used. We can however, also furnish any of these washers in thicknesses ranging from $\frac{1}{32}$ inch to $\frac{1}{8}$ inch.*

No. 8 Lead Washers supplied in five-pound cartons. All others in ten-pound cartons, or 100-pound boxes. Standard shipping package of all sizes is one hundred pounds.

PRODUCTION

Bunker Hill Lead Washers as listed above are all produced by pneumatic press. This method of manufacture guarantees absolute uniformity in each washer; inside and outside diameters are accurate; the hole is true and perfectly centered; and the thickness of the metal is consistently as listed.



Producing Bunker Hill Lead Washers on pneumatic press. Several washers are punched out in one operation.

BUNKER HILL PRODUCTS PURE LEAD - LEAD ALLOYS

SPECIAL BUNKER HILL LEAD WASHER SIZES

In addition to the "Standard" Bunker Hill Lead Washers listed on the preceding page, we also can furnish on short notice any of the following sizes. These are considered as "Special" sizes, not carried in stock, and made only to order. Made with flat, smooth surface, accurate in dimensions as listed.

Inside Diameter	Outside Diameter	Inside Diameter	Outside Diameter	Inside Diameter	Outside Diameter
1/8"	1"	9/16"	1 3/8"	1 1/8"	2"
3/16"	3/4"	5/8"	13/16"	1 3/32"	1 11/16"
5/16"	1"	5/8"	7/8"	1 1/4"	2 1/4"
3/8"	7/8"	5/8"	1 1/2"	1 5/16"	1 13/16"
7/16"	1"	11/16"	1 13/16"	1 5/16"	1 7/8"
7/16"	1 1/4"	3/4"	2"	1 3/8"	1 13/16"
1/2"	1 1/8"	13/16"	2 1/2"	1 3/8"	2 1/4"
1/2"	1 3/4"	15/16"	2"	1 3/8"	2 3/8"
17/32"	1"	1"	1 5/16"	1 1/2"	2"
				1 1/2"	2 1/4"

Thickness: All above sizes can be furnished in 1/32", 1/16", 3/32", or 1/8" thickness. Specify Inside Diameter, Outside Diameter and thickness when ordering.

SPECIAL BUNKER HILL LEAD GASKETS

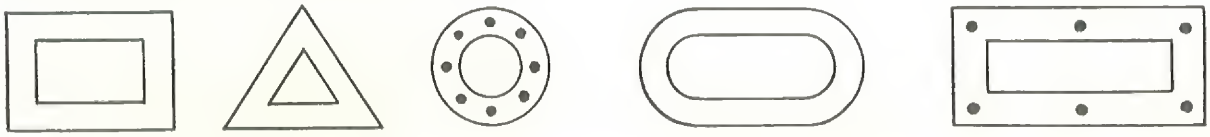
Sizes larger than 1½ inches Inside Diameter, are classified as "Gaskets." These are also made by punch press and are strictly accurate in size. Lead Gaskets are all made flat unless otherwise specified. The following can be furnished on short notice, (other sizes made to order):

Inside Diameter	Outside Diameter	Inside Diameter	Outside Diameter	Inside Diameter	Outside Diameter
1 9/16"	2 3/4"	1 13/16"	2 19/64"	2 15/32"	3 1/16"
1 5/8"	2 7/64"	2"	2 21/32"	2 1/2"	3 1/4"
1 5/8"	2 1/8"	2 1/8"	2 5/8"	2 7/8"	3 1/2"
1 5/8"	2 7/16"	2 3/8"	2 7/8"	3 7/16"	4 1/4"

Thickness: All above sizes can be furnished in 1/32", 1/16", 3/32", or 1/8" thickness. Specify Inside Diameter, Outside Diameter and thickness when ordering.

SPECIAL SHAPES

Odd sizes of any dimension, or lead gaskets of special style or shape can be furnished according to specifications. Made in any thickness, in soft or hard lead. For special purposes we can also supply lead gaskets or lead washers with ribbed or recessed surfaces, and cut for bolt holes where required.



Orders covering special lead gaskets should be accompanied with a detailed drawing or template. Also specify thickness and whether soft or hard lead is required.

BUNKER HILL LEAD SASH WEIGHTS

Lead sash weights are often used where a heavy counter-balance is needed, or where it is necessary to conserve on space. A lead weight also provides quiet operation, eliminating the metallic sound often connected with the use of other metals.

Bunker Hill Sash Weights are commonly supplied with cast iron eye, solidly anchored in the lead. We also supply weights with hooks, pulleys, etc., for special work.

TO ESTIMATE LENGTH REQUIRED

One cubic inch of lead weighs 6 7/12 oz., or .4092 pounds.
One cubic foot of lead weighs 707 pounds.

STANDARD SIZES—ROUND

(First three listings can usually be supplied from stock. Others are made to order, requiring a little longer time to supply.)

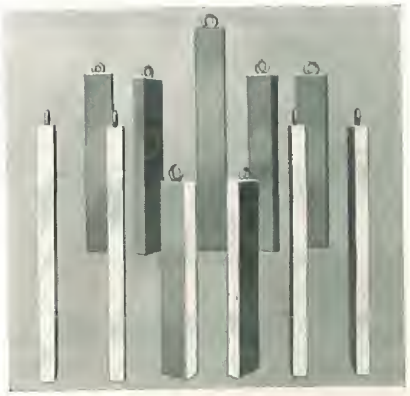
Diameter	Approx. Wt. Per Foot	Diameter	Approx. Wt. Per Foor	Diameter	Approx. Wt. Per Foot
1″	3½ lbs.	2″	14¾ lbs.	3″	34¾ lbs.
1¼″	5½ lbs.	2¼″	19½ lbs.	3½″	47 lbs.
1½″	8 lbs.	2½″	24 lbs.	4″	62 lbs.
1¾″	11¼ lbs.	2¾″	29 lbs.	5″	96 lbs.

Figure from 1 inch to 2 inch extra on overall length, according to weight, to allow for cast iron eye.

STANDARD SIZES—SQUARE

Dimensions	Approx. Wt. Per Foot	Dimensions	Approx. Wt. Per Foot	Dimensions	Approx. Wt. Per Foot
1″ x 1″	4½ lbs.	1½″ x 1½″	11 lbs.	2¼″ x 2¼″	24½ lbs.
1¼″ x 1¼″	7½ lbs.	2″ x 2″	19½ lbs.		

Figure from 1 inch to 2 inches extra on overall length, according to weight, to allow for cast iron eye.



RECTANGULAR WEIGHTS

Rectangular Lead Sash Weights made up according to requirements. Specify dimensions and weight required when ordering.

SPECIAL LEAD WEIGHTS

Lead Weights of special sizes and shapes are made by us for all purposes. Detailed drawing should accompany orders for special weights.

We also supply counterbalance weights for scales, elevators, and other equipment.

ROD LEAD

Solid lead bar, without eye, can be supplied in any common round, square, or rectangular size.

MISCELLANEOUS BUNKER HILL LEAD PRODUCTS

LEAD ROOF FLANGES

Bunker Hill Lead Roof Flanges (sometimes referred to as roof flashings) are of all-lead construction, insuring a watertight, flexible flashing around pipe outlets. Made in standard and heavy weights.

In ordering, specify iron pipe size, weight desired and pitch of roof. Unless otherwise specified forty-five degree pitch is furnished.

(See Page 11 for data on Plain Lead Flashing and Sheet Lead.)

LEAD ROOF BOXES AND LEADER-HEADS

Made to special order in either plain lead, as illustraded at left, or of ornamental design for exterior architectural purposes, as shown at right. Patterns are not standard—made to order only.

Orders or inquiries should be accompanied by detailed sketch or template.

OTHER LEAD ITEMS

We can make practically any form of metallic lead product (in either soft or hard lead) and will be glad to work with you on your requirements. Some of our special items are as follows:

Lead and Lead-Lined Bottles	Lead Hammers
Lead and Lead-Lined Boxes	Lead Linings
Lead Castings	Lead Ornaments
Lead Coatings	Lead Shapes
	Lead Stair Treads
	Lead Weights

BUNKER HILL LEAD WIRE SIZES

All Bunker Hill Lead Wire is hydraulically extruded through steel dies, insuring uniformity of diameter and freedom from irregularities or air pockets in the metal.

All sizes as listed can be supplied in either chemically pure Bunker Hill Lead, or in lead alloys made up to specification.

SMALL SIZES—FOR METAL SPRAY GUNS, ETC.

(On Spools of 10, 20 or 100 pounds, as specified.)

Gauge No. (Birmingham or Stubs)	Diameter Decimal	Diameter, Fraction (F: Full; S: Scant)	Approximate Feet Per Pound
16 (No. 14 B & S Gauge)	.065″	1/16″ F	60
15 (No. 13 B & S Gauge)	.072″	5/64″ S	50
12 (B & S Gauge)	.081″	5/64″ F	45
14	.083″	5/64″ F	40
13	.095″	3/32″ F	26
10 (B & S Gauge)	.102″	7/64″ S	24
12	.109″	7/64″	22
11	.120″	1/8″ S	18

LARGE SIZES—LEAD BURNING BAR, ETC.

(On 100 pound Spools, unless otherwise specified.)

Diameter Fraction	Diameter Decimal	Approximate Feet Per Pound	Diameter Fraction	Diameter Decimal	Approximate Feet Per Pound
1/8″	.125″	16	11/32″	.344″	2 1/4
5/32″	.156″	10 1/2	23/64″	.359″	2
3/16″	.188″	8	3/8″	.375″	1 3/4
7/32″	.219″	6	7/16″	.438″	1 1/2
1/4″	.250″	4	31/64″	.484″	1 1/4
5/16″	.313″	2 3/4	1/2″	.500″	1

SPECIAL LEAD WIRE SIZES

Style	Dimensions	Style	Dimensions
Square	1/4″ x 1/4″	Half-Oval	1″ x 7/16″
Square	3/8″ x 3/8″	Half-Oval	1 1/16″ x 9/32″
Square	5/8″ x 5/8″	Triangular	3/16″ x 3/16″ x 3/16″
Half-Round	5/16″ x 5/32″	Wedge Lead	See page 44

Other special sizes and shapes made to order.

IMPRESSION LEAD

Some of the smaller sizes of Lead Wire are sometimes referred to as "Impression Lead," for use in bearing alignment work. Bunker Hill Soft Lead is recommended for this purpose.

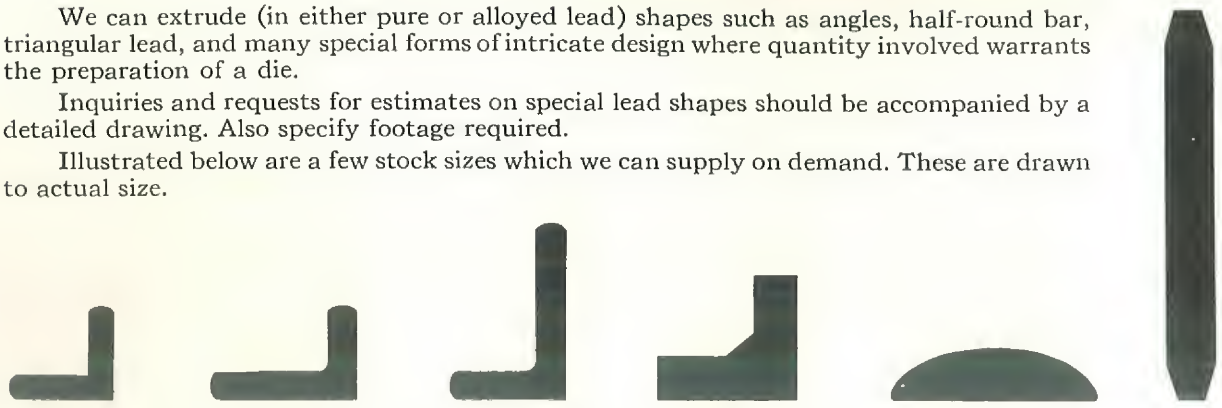
Ten-Pound Spools of Bunker Hill Lead Wire for Metal Spray Gun work. Bunker Hill Wire is uniform in diameter and well packed to avoid dents, kinks, or damage in shipment. Supplied in either pure lead or in special lead alloys.

SPECIAL LEAD SHAPES

We can extrude (in either pure or alloyed lead) shapes such as angles, half-round bar, triangular lead, and many special forms of intricate design where quantity involved warrants the preparation of a die.

Inquiries and requests for estimates on special lead shapes should be accompanied by a detailed drawing. Also specify footage required.

Illustrated below are a few stock sizes which we can supply on demand. These are drawn to actual size.



1 2 3 4 5 6

BUNKER HILL WEDGE LEAD

1 2 3 4 5

DIMENSIONS

No. 1 — $\frac{3}{16}$ inch to point, $\frac{1}{2}$ inch wide.
No. 2 — $\frac{1}{4}$ inch to point, $\frac{1}{2}$ inch wide.
No. 3 — $\frac{7}{16}$ inch to point $\frac{3}{4}$ inch wide.
No. 4 — $\frac{5}{32}$ inch to point, $\frac{1}{16}$ inch wide.
No. 5 — $\frac{3}{8}$ inch to point, $\frac{1}{16}$ inch wide.

Other Sizes Made to Order.

For masonry or monument work. Made of soft lead—easy to handle. Consistently true to dimensions.

Supplied on spools, approximately one hundred pounds, unless otherwise specified.

BUNKER HILL BAR LEAD

Pure Bunker Hill lead, manufactured in bars of convenient size for small job use.

Bars measure $\frac{1}{2}$-in. wide, $\frac{1}{8}$-in. thick, and 12 inches long.

Supplied in 100-lb. boxes, unless otherwise specified.

NORTHWEST LEAD COMPANY

BUNKER HILL LEAD PRODUCTS FOR THE LABORATORY

During the past few years there has been a marked advance in the equipment used for chemical and physics laboratories in high schools, colleges, hospitals and in the technical departments of various industrial plants. In many instances it has been proven that lead, or lead-lined equipment is most suitable and most economical.

In conjunction with the advances in equipment we have developed a line of laboratory sink accessories adaptable to the many varied conditions under which such equipment is placed. These accessories are made for use with lead or lead-lined sinks, stoneware, acid-resisting steel, etc., and are illustrated below.

LEAD-LINED SINKS AND TRAYS

We manufacture all-lead and lead-lined sinks and trays to specification. These are made from either Bunker Hill pure lead or various lead alloys. In this work all seams and joints are burned (or welded) to assure strong, acid-resistant and leak-proof work.

We will be pleased to give you our recommendations for the use of lead with various acids, and to provide estimates on lead or lead-lined work of this nature. A sketch should accompany inquiries.

ALL LEAD LABORATORY FITTINGS

Standard Plug and Seat
(Style A)

STYLE "A"

A simple all-lead outlet for use with lead-lined sinks. Machined to make water-tight connection between plug and seat.

Seat is made to be lead-burned in place in lead or lead-lined sink. Furnished in 1¼-, 1½-, and 2-inch sizes.

Riser plugs as shown in Styles C and D may also be used with this outlet seat.

STYLE "B"

An all-lead sink drain outlet, furnished with brass nut, as illustrated. May be used with any type of laboratory sink and should be set in white lead paste when installed.

Plug to accompany Style B outlet may be as shown in Styles A, C, or D.

Furnished in 1¼-, 1½-, and 2-inch sizes.

Threaded Drain and Plug Seat
(Style B)

BUNKER HILL PRODUCTS PURE LEAD - LEAD ALLOYS

CHEMICAL LABORATORY LEAD PRODUCTS

Riser Plug and Seat (Style C)

STYLE "C"

Designed for use with lead or lead-lined sinks. Outlet seat is made for lead-burning to floor of tank.

Riser plug is known as "Beehive" strainer type. Furnished five inches in height, unless otherwise specified.

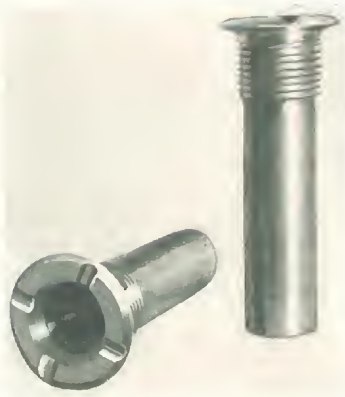
STYLE "D"

A "Beehive" strainer plug of same design as Style C, except that overflow holes are placed well down the face to provide rapid drainage. Furnished five inches high, unless otherwise specified.

Riser Plug and Seat (Style D)

Styles C and D are commonly furnished in $1\frac{1}{4}$", $1\frac{1}{2}$", and 2". Can also be furnished in special sizes on short notice. Outlet seats in Styles B, Q, and R, will also accommodate the Beehive Strainer Plugs.

Strainer and Tail-Piece (Style Q)



STYLE "Q"

A strainer and threaded tail-piece for use with acid resisting enamel or composition sinks. Face of seat is grooved to permit complete drainage of sink.

Should be seated with white lead or a sealing agent and drawn tight with nut supplied.

Tail-piece may be connected with any type of drainage line.

STYLE "R"

Of similar design to Style Q, but with heavier flange on face. This is made for use with lead-lined wooden sinks and should be countersunk to floor level and lead-burned in place.

Cinching from underneath, with nut supplied, provides a tight, rigid joint.

Heavy tail-piece may be used with any type of drainage line.

Strainer and Tail-Piece (Style R)

Styles Q and R are supplied in any standard size. Both styles are supplied with removable lead strainer which fits into recess under face of outlet.

Both styles will accommodate solid lead plug or lead "Beehive" plugs as illustrated in Styles C and D.

CHEMICAL LABORATORY LEAD PRODUCTS

Non-Syphon
Lead S Trap

NON-SYPHON TRAPS

These Bunker Hill Traps are made entirely of lead and are recommended for general chemical laboratory waste line use.

Supplied with or without hard lead cleanout, as illustrated. Joints are all lead-burned, making acid-proof connections.

Unless otherwise specified, both "S" and "P" Non-Syphon Lead Traps are furnished with four inch by eight inch body, with one and one-half inch outlet, extending six inches beyond body of trap. Other sizes made to specification.

Cleanout is always at base of trap, unless ordered otherwise.

Non-Syphon
Lead P Trap

MISCELLANEOUS BUNKER HILL LEAD LABORATORY ACCESSORIES

Styles and designs shown on these pages are commonly supplied for laboratory use, but we also make many special products of similar nature. These lead products for acid-line work, or special lead laboratory items can often be made up quite economically and under most laboratory conditions will give long trouble-free service.

Estimates furnished on any lead work. A drawing or sketch should accompany inquiries.

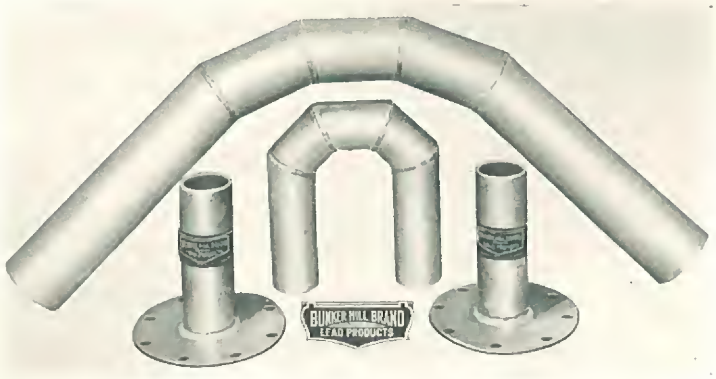
SPECIALS

Typical of special lead work occasionally required for laboratories are the two items illustrated at the bottom of this page.

At left is a very simple drainage assembly in a lead-lined tray. A hard lead plug is lead-burned to the lead covered steel screw rod, providing an easily adjustable water-tight outlet.

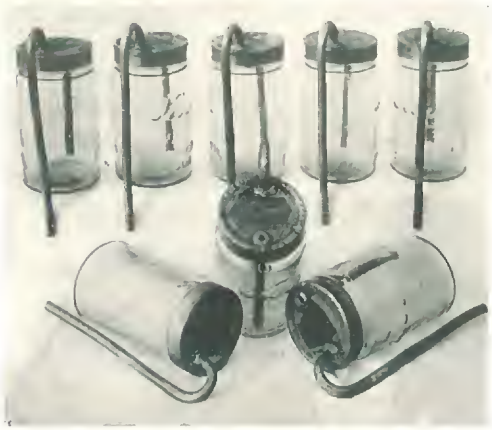
At right is shown a combination lead and monel metal plug cock for use on acid storage tank of light pressure.

We welcome your inquiries on special lead work of simple or intricate nature.



Bunker Hill Lead Connections for use in the Acid Lines of an Industrial Plant.

SPECIAL LEAD FITTINGS, BENDS AND CONNECTIONS FOR ACID HANDLING



Lead-covered Glass Jars to contain Formaldehyde. Used in the sanitation systems of some Western Mausoleums.

In the handling of corrosive acids, fumes, miscellaneous liquids and chemicals, lead is often employed because of its acid resistant properties and the readiness with which it adapts itself to unusual shapes and designs, without the necessity of costly patterns.

Bunker Hill Special Lead Fittings, connections, etc., are to be found in many varied industries. The illustrations are indicative of the special work that can be made in either pure soft lead or in the harder lead alloys, according to conditions of service.

The possibilities for forming special lead fittings of any size or shape are practically unlimited and we will be glad to work with you in providing a lead product fitted to your requirements.

Lead Offset Bends—indicating the varied shapes than can be supplied.

Lead Acid Air Lift

Two-Way Flanged Lead Fittings, made of Bunker Hill Hard Lead Alloy.

NORTHWEST LEAD COMPANY

Cast Lead Finial

BUNKER HILL LEAD CASTINGS

Lead castings in soft, pure lead or lead alloys, for industrial, architectural or general work. We can furnish practically any cast lead item from an ounce to several tons in weight.

Bunker Hill lead castings are rigidly inspected and free from laminations, blow holes or pitting.

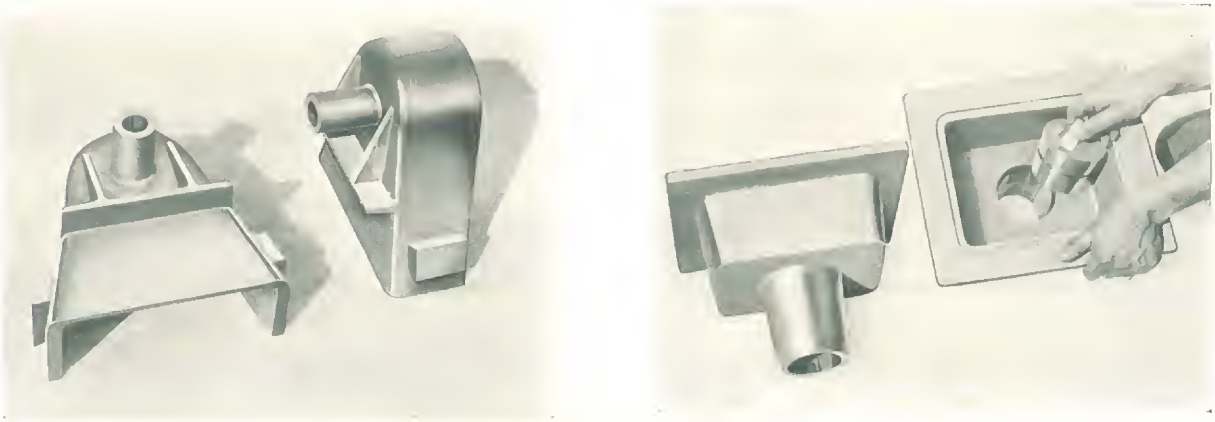
Also manufacturers of small cast lead weights for miscellaneous purposes. (See pages 33-35 for cast lead fishing sinkers, etc.)

LEAD FOR CASTING WORK

Foundries and plants making their own castings will find Bunker Hill pure lead and lead alloys highly satisfactory. Supplied in pig or bar form.

Lead Test Weight

NOTE: *In lead casting work figure roughly a shrinkage ratio of one-eighth inch per lineal foot.*



Bunker Hill Antimonial Lead Castings made in carload quantity for a Western Copper Refinery. Illustration at left shows lead casting used for handling solution overflow in electrolytic tank. At right, a sump drainage unit with machined hard lead plug.

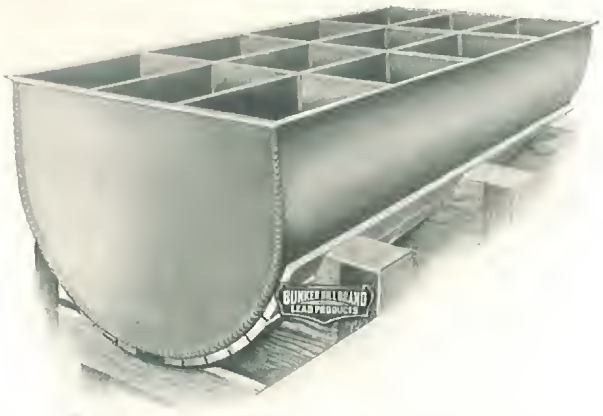
LEAD RIVETS

Where corrosive conditions are detrimental to other metals, or where service is light, lead rivets may sometimes be used. Not recommended for heavy work.

Furnished in any common size if sufficient quantity is involved. Supplied in pure lead or lead alloys. Illustrated are cone-head hard lead rivets, $\frac{3}{8}''$ in diameter with 1″ body.

BUNKER HILL PRODUCTS PURE LEAD - LEAD ALLOYS

Flanged Lead "Y" Reducers for Sulphuric Acid Unit of a Coke By-Product Plant.



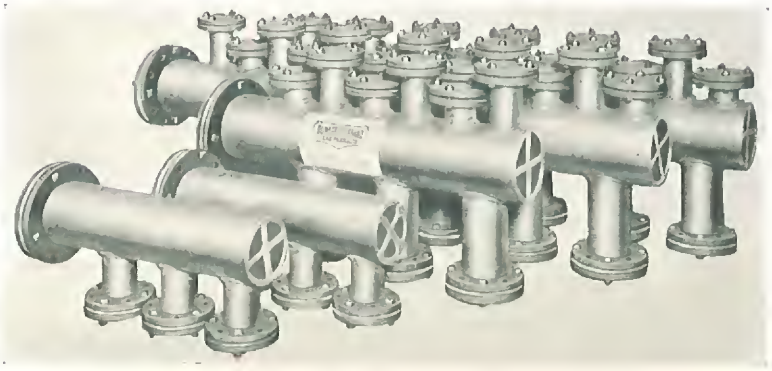
All-Lead Separator Tank used in the handling of acids in a Powder Plant.

BUNKER HILL SPECIALTIES FOR INDUSTRIAL USES

The Northwest Lead Company has worked for many years with industrial organizations on their lead problems and we are prepared at all times to give prompt service on lead requirements of any nature.

We maintain a staff of lead burners familiar with every phase of lead work, and are equipped to give the highest quality workmanship and materials in the manufacture of all our lead products.

Our experience with the handling and uses of lead in industrial applications may be of assistance to you. Your inquiries will be given prompt and intelligent attention.



Flanged Heavy Lead Headers for Pressure Acid Lines in a Western Refinery.

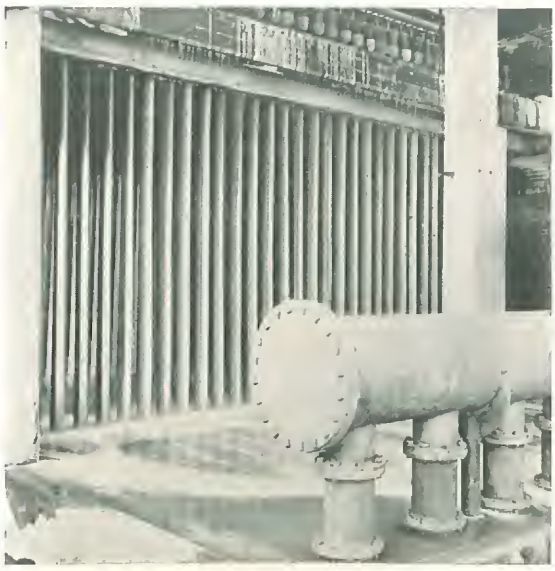
Antimonial Lead Coils for Acid Heating

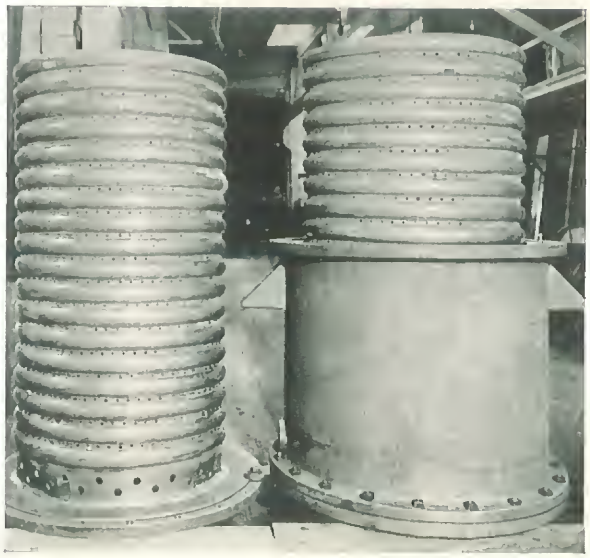
BUNKER HILL LEAD SPECIALTIES FOR PULP and PAPER MILLS

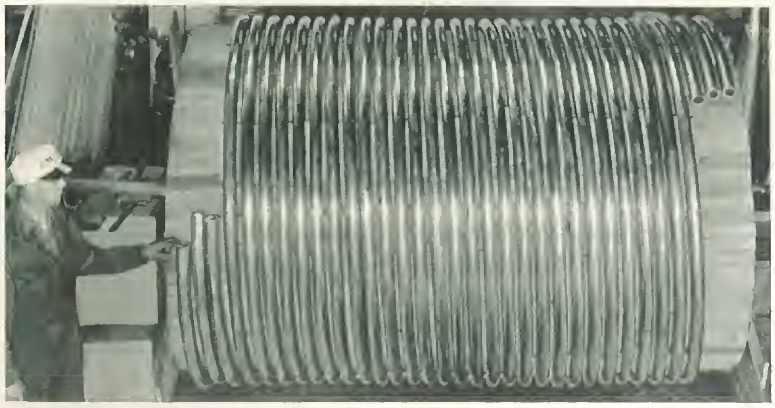
Sulphite pulp and paper mills are among the largest individual consumers of lead products, which are principally used by them in handling sulphur dioxide and sulphurous acid.

For the past several years Bunker Hill lead products have been in daily use in practically all West Coast sulphite mills, as well as in Kraft plants, and we specialize in furnishing and installing this work.

A few of the special pulp and paper mill lead products made by us are illustrated. At top—a group of ball-peep showers; Center—flanged hard lead headers; Left bottom—elliptical lead pipe in gas cooling system; Right bottom—coolers made of hard lead pipe and perforated lead webbing.





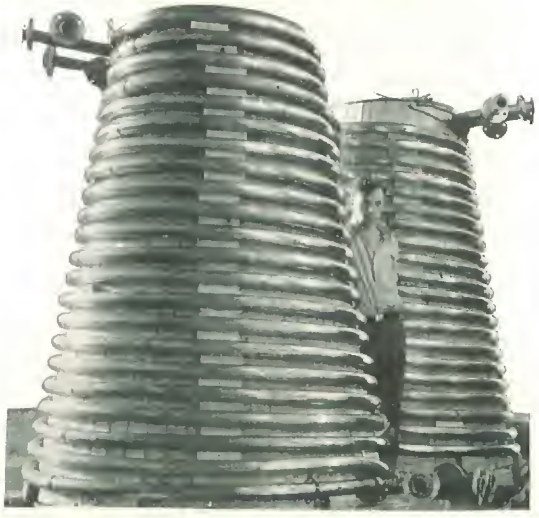


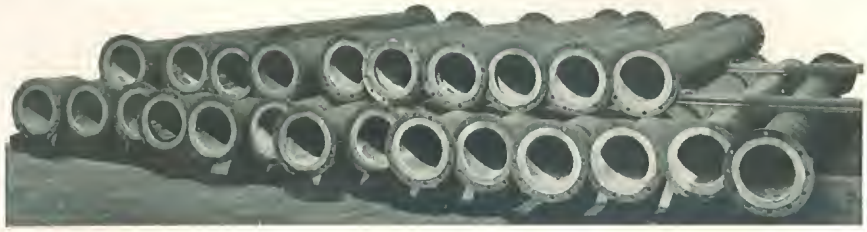
SPECIAL LEAD COILS FOR

ACID CIRCULATING SYSTEMS

We make lead coils of all kinds. Supplied in pure lead or in alloys as specified. If desired, on large coils, we can also supply the wooden drums or forms.

Bunker Hill Lead Coils are made in our own plant, by our own men. Guaranteed satisfactory in workmanship and material.





Twelve-inch Wrought Steel Pipe, with Bunker Hill Lead Lining in place. Note the manner in which lead lining is flanged over ends, to make a complete lead-to-lead job when assembled.

BUNKER HILL LEAD-LINED PIPE AND FITTINGS

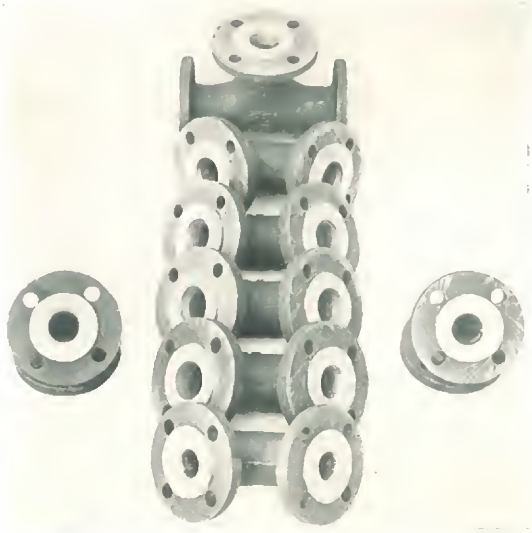
A Close-up of Lead-Lined Pipe and the method we employ in protecting it from damage in shipment.

Where high pressures are encountered in the handling of corrosive materials, or where it is necessary to protect lead piping from outside damage, it is often found advantageous to use lead-lined steel or iron pipe.

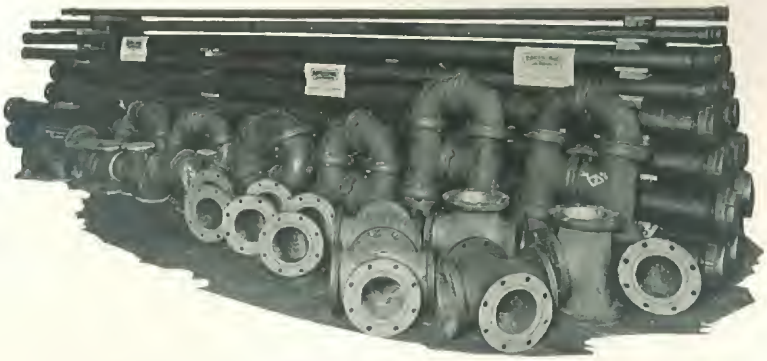
We are fabricators of this material—either supplying the complete job, or lead-lining materials as furnished us.

Let us give you our recommendations and estimates on lead-lined pipe and fitting work.

Beating out the Lead Flange on a Lead-Lined Steel Ell.



A Group of Small Iron Pipe Fittings for acid handling, lined and flanged with Bunker Hill Lead.



Bunker Hill Lead-Lined Steel T's, Bends, Crosses and Miscellaneous Flanged Steel Fittings, together with a Quantity of Lead-Lined Screw Pipe.

BUNKER HILL LEAD-LINED PIPE AND FITTINGS

We lead-line practically any size of steel or iron pipe, as well as bends, ells, T's, Y's, reducers, nipples, crosses, etc. On pipe sizes up to twelve inches inside diameter a seamless lead-lining is provided. Larger sizes made to special order.

Bunker Hill Linings are made of pure lead, with a tight bond between the two metals.

It is our recommendation that flanged pipe and fittings be used wherever possible. We also lead-line screw pipe and fittings.

Orders and inquiries should specify inside diameter of the material to be lined, thickness of lining desired and details as to type of pipe, flange drilling, etc.

We Lead-Line Shapes of All Kinds. Illustrated are Long-Angle Steel Bends, showing Lead Lining extended over Face of Flange to bolt hole circle.

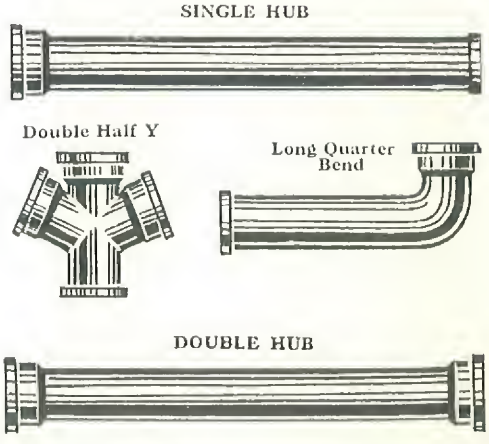
BUNKER HILL LEAD-LINED SOIL PIPE AND FITTINGS

For use principally in school or industrial laboratory acid waste lines, where strength and corrosion resistance are required.

We can make up a complete lead-lined soil pipe job from blueprint or drawings—supplying all materials completely lead-lined; or can lead-line materials as supplied us. Pipe and fittings should be reasonably smooth inside, and should be cut to finished lengths before lining.

Orders and inquiries should state the inside diameter of the material to be lined and the thickness of lining desired. If we are to furnish iron pipe and fittings, give full details as to weight, lengths, angle of bends, etc.

Prices on application.



Cast Iron Soil Pipe and Fittings for Laboratory use may also be Lead-Lined. Supplied in Standard or Heavy Weights.

BUNKER HILL ALL-LEAD AND LEAD-LINED TANKS

Illustrations at upper and lower left side of page show tanks made entirely of lead, together with removable covers.

Illustration on right shows installation of lead lining in typical circular lead-lined wooden tank for acid storage.

All joints on Bunker Hill lead and lead-lined tanks are made of "burned" seams, water-tight and acid proof.

The making of all-lead and lead-lined tanks, of all shapes and sizes, is a specialty with the Northwest Lead Company. These may be made up complete in our plant, or where feasible, made up and installed on location.

Where rigidity or increased tensile strength is desired, it is common practice to make lead tanks, or tank linings, of antimonial "hard" lead or other lead alloys. This is especially true where tanks are of large size. For small tanks, or where added strength is not essential, pure soft lead is customarily used.

Recommendations and quotations gladly given on receipt of specifications. Inquiries should be accompanied by sketch and as much detail as possible.

Series of Lead-Lined Electrolytic Cells in a Zinc Refinery. Contract covering Labor and Materials handled by us.

Typical crew of Lead Burners employed by us on a Western Industrial Plant Lead-Lining Contract.

LEAD-LINING CONTRACTS

Looking down a Lead-Lined Acid Storage Tank. Lead-Burner is "burning" seam on Sheet Lead Lining.

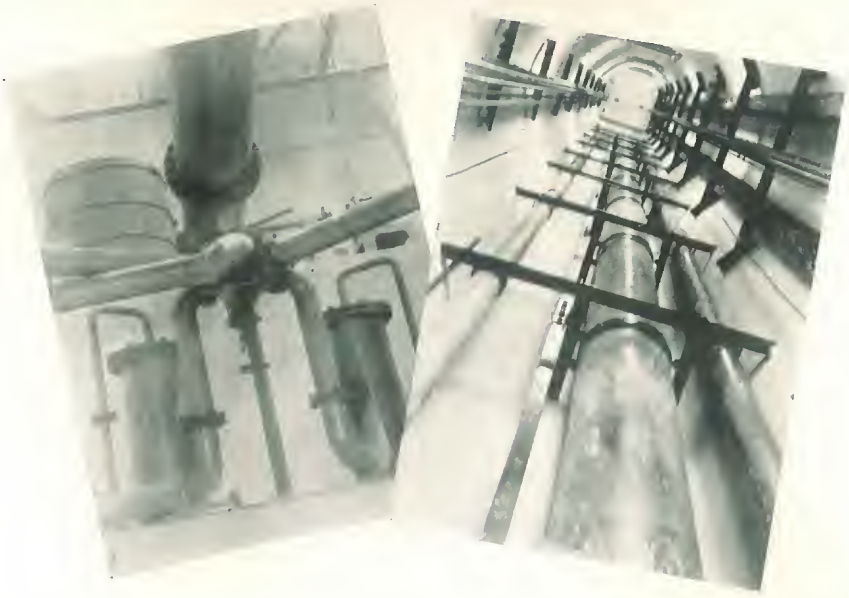
Acid, chemical and industrial plants often find it expedient to have lead-lining installations handled by lead manufacturers or crews regularly engaged in lead work.

Our long experience and thorough familiarity with every phase of lead-lining work will often prove of value to the industrial plant making a lead installation. The lead workers employed by us are of proven ability and experience in the handling of lead and we are at all times in position to get crews on the ground on short notice.

Contracts handled covering both material and labor, material or labor only, or partial contracts to assist in the fabrication of special lead or lead-lined units.

Group of Steel "Foamite" Storage Tanks, completely lined with Bunker Hill Lead. Note Lead crews at work installing Lead.

GENERAL LEAD INSTALLATION CONTRACTS

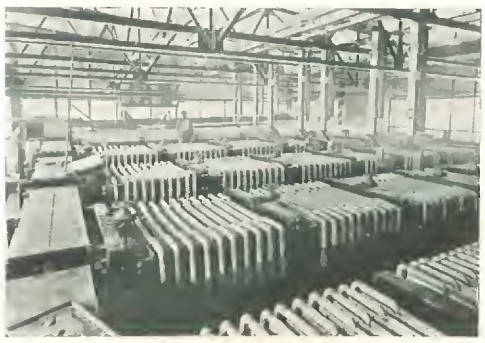


At Left: Bunker Hill Lead Piping and Tanks handling corrosive gas and acid in a Pulp and Paper Mill. At Right: Looking up a hundred-foot Tower in same mill, showing three runs of Bunker Hill Lead Pipe.

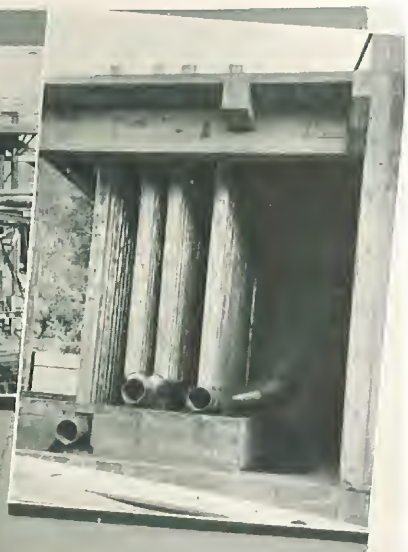
We handle lead contracts of all kinds for industrial, general, ornamental or special purposes. From the manufacture of lead pipe, sheet lead, and miscellaneous products in our plant, to their installation in the field, the Bunker Hill name will mean satisfaction and service in every respect.

Estimates and recommendations given on lead installation work of any size or character.

Part of Northwest Lead Company crew installing a Lead Roof. Material and labor furnished by us under contract.



Contract Installation of Bunker Hill Lead Pipe Bends and Coils in a Western Metal Refinery.



TYPICAL BUNKER HILL LEAD JOBS

❊

Upper

Lead-lined acid drain tanks. Sulfuric Glover tower, tanks and piping—all of lead.

Elliptical piping in a sulphite pulp mill.

Center

Oil, kerosene and gasoline agitator tanks, lead-lined.

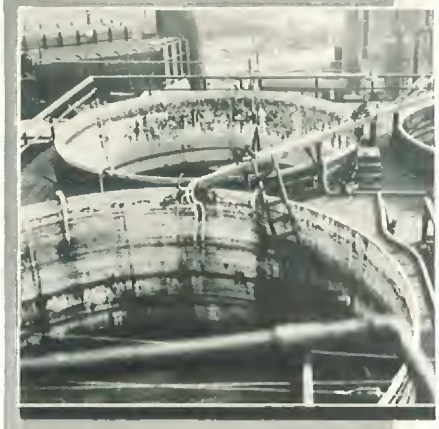
Lead work in acid sludge storage tanks.

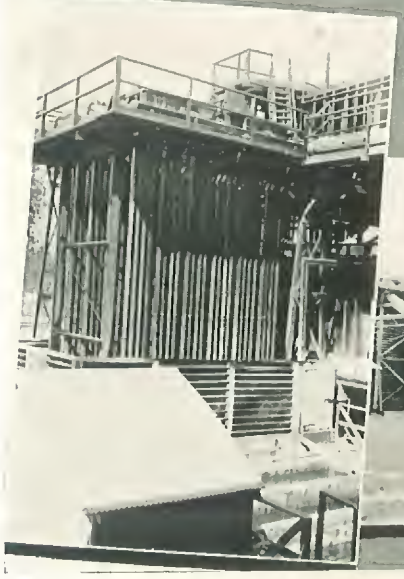
Bottom

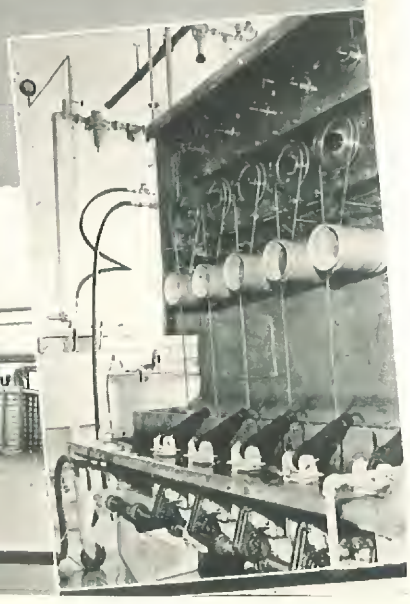
Lead cooling stack and lead-lined open tanks in acid plant.

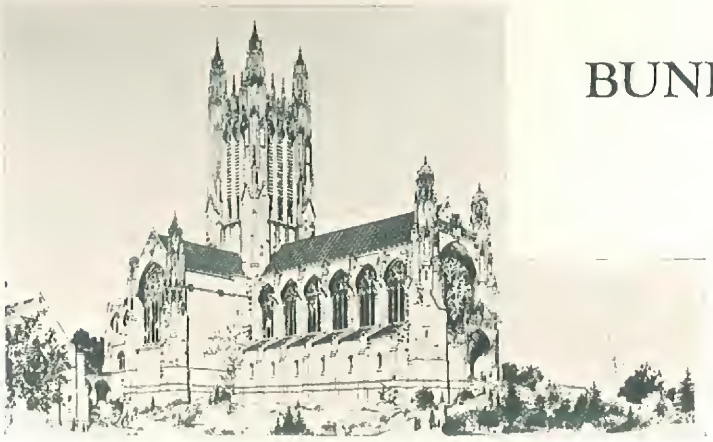
Twin lead chambers in sulfuric acid manufacture.

Rayon unit; lead used for all exposed surfaces.









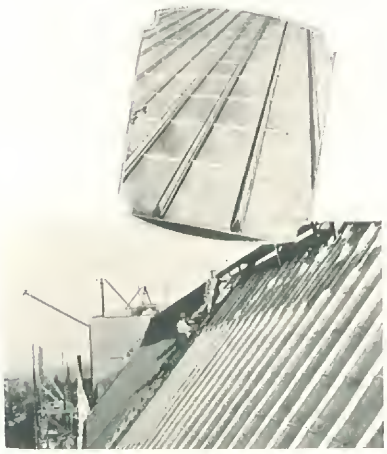
Cathedral of St. John the Evangelist, Spokane, roofed with Bunker Hill Lead. Architect, H. C. Whitehouse, Whitehouse & Price.

BUNKER HILL LEAD ROOFS

The use of lead for roofs is as old as history itself, and many cathedrals and buildings of the old world are today using the lead roofs that were placed on them centuries ago.

Modern architects are turning increasingly to the use of lead for roof work, both in exposed and hidden areas. Its primary value for this purpose is in a permanent care-free service, but it also receives favor because of its adaptability to practically all types of architecture, its pleasing color, and non-staining quality.

We contract for complete lead roof installations, and supply lead roof material of any nature. Estimates and recommendations, based on our long experience with this kind of work, furnished on request.



Detail of Lead Roof Panels, and crew installing Sheet Lead on a Cathedral roof.

Grace Cathedral, San Francisco, during construction. Bunker Hill Lead Roof is shown on finished portion, and the entire Roof will be completely covered with Lead when finished. Architect, Lewis P. Hobart.

GENERAL ADAPTABILITY OF LEAD FOR ROOF WORK AND ORNAMENTAL PURPOSES

Bunker Hill Lead ridge flashing on a modern residence.

ROOF FLASHINGS

Lead makes an ideal material for flashing ridges, valleys, gutters, chimneys, etc. It is flexible, easily handled on the job, readily cut to shape and will give long trouble-free service. Lead flashings are also desirable because of their nonstaining quality.

Bunker Hill Lead Flashings are furnished in standard roll sizes as listed on Page 11. Other weights and sizes made to order.

ROOF FLANGES

Details and illustration of Bunker Hill Lead Roof Flanges appear on page 42.

ORNAMENTAL LEAD

In addition to the architectural value of lead for large roof areas, as detailed on Page 59, it is of immense ornamental value in many places for residential and general building purposes, both for interior and exterior work.

Among the many applications of lead, it may be used to advantage for downspouts and leader-heads, as illustrated here and on Page 42; for statuary work, flower pots, ornamental trim and frieze work. The unobtrusive color of the lead lends itself to architectural requirements — and at the same time provides a non-corrosive material of extremely long life.

Typical Bunker Hill decorative lead work. Above: A hand-wrought panel for a window frieze. Below: Cast lead panel of marine design over swimming pool porch.

Decorative lead work may be made either by casting in moulds, or by beating the design or pattern into the lead by hand (repoussé work). For both purposes it is customary to make the piece of a lead-alloy which will add hardness, but not destroy the appearance or workability of the metal.

All ornamental and decorative lead work is made to special order. Quotations on request.

An all-lead downspout and leader-head. Attractive and non-staining.

SOME CHEMICAL COMPOUNDS WITH WHICH LEAD MAY BE USED

A detailed listing of all chemical compounds and their effect on metallic lead would require a great deal more space than can be devoted herein. Furthermore, due to variations in operations of plants manufacturing or handling acids and the wide range of acid and chemical solutions which are required in various processes, it is impracticable to attempt to establish a definite range of limits within which lead may be utilized.

In considering the corrosion of lead (as with other metals) there are many factors to be borne in mind:

For instance, corrosion is accelerated by surface strain, mechanical strain or stretching of the metal. The concentration and temperatures of acids and gases will greatly affect the corrosion rate. Dilutions and the presence of impurities will cause variations in results. In some instances, where protection is given through the forming of a film on the lead surface, variations will appear due to differences in the velocity or flow of acid or liquor.

The following list is by no means a complete one, but covers the use of lead within the range of chemical compounds commonly used. As stated above, lack of uniformity in practice makes it impossible to be specific in establishing a listing, and the purpose of this tabulation is therefore intended only as a general guide.

Where an unusual corrosion problem in the use of lead is encountered we will be very glad to assist in solving it. We suggest that a complete and detailed report of operating conditions accompany your inquiry.

ACETIC ACID: Lead may be used for weak, concentrated and glacial acid storage; for reaction vessels in concentrated acid system, etc. Pipes carrying dilute acid should be kept full, as presence of air will accelerate corrosion.

ACETIC ANHYDRIDE: Temperatures of 20 °C. to 80 °C.

ACETONE.

ALCOHOL, ETHYL: Does not appreciably affect lead.

ALUMINUM SULPHATE: For all strengths. Reaction agitators, evaporators, piping, pumps, valves, etc.

AMMONIA, LIQUID: Lead may be used with liquid ammonia, but is soluble to some extent when metallic sodium or potassium are present.

AMMONIUM CHLORIDE: Solutions of ten percent may be satisfactorily handled in lead. Used for Reaction vessels, concentrators, etc.

AMMONIUM HYDROXIDE: See "Ammonia Vapor."

AMMONIUM PHOSPHATE: Acid feeders, saturators, evaporators, piping, pumps, etc.

AMMONIUM SULPHATE: Lead is used on a wide scale for handling this material.

AMMONIA VAPOR: Lead may be used in all concentrations and at temperatures up to 600 °C. Lead is practically the only common metal for handling ammonia vapor satisfactorily.

ANTIMONY CHLORIDES: Lead is slightly corroded, but is considered one of the most economical materials for chlorinating the trichloride to the pentachloride.

BENZYL CHLORIDE.

BLEACH LIQUORS: Lead chambers, tanks and piping are used in the handling of some bleach liquor solutions.

BORIC ACID: Lead is commonly employed in the production of boric acid.

BROMINE: Lead may be used for relatively cold, acid-free liquid bromine.

BYPRODUCT COKE: Lead-lined piping and valves are often employed in some parts of this system.

CALCIUM CARBONATE: Plumbo-solvent waters being conveyed in lead piping are sometimes treated with calcium carbonate to the extent of four parts per one hundred thousand of water or more, to reduce corrosion.

CALCIUM FLUORIDE.

CARBON DIOXIDE: (Acid-carbonate system). Generators, tank linings, etc. Lead is slowly attacked by warm moist CO_2 in the presence of acetic acid vapors. Waters containing small amounts of carbon dioxide are protective to the lead surface.

CARBON TETRACHLORIDE: Lead is used in the production, handling and storage of finished product.

CASEIN: With sulphuric acid mixtures.

CEMENT MANUFACTURE: Wet gases from cement mills may contain either SO_2 or H_2S and may carry alkali, chloride and sulphate mists, as well as small amounts of sulphuric acid mists. At temperatures below dew point (where trouble is encountered with corrosion of steel) lead may be satisfactorily used to convey these gases, as well as for protective linings for other equipment.

CHLORACETIC ACID: Lead may be used, within certain limitations, in the chlorination of acetie acid. Temperature ranges from 20°C. to 100°C. are common.

CHLORINE: Lead-lined tanks, chambers, etc. (See also Chlorine Gas.)

CHLORINE GAS (Moist): Chlorinators, tank linings, absorption chambers, etc. At temperatures up to 100°C., or in some instances, higher.

CHROMATES and BICHROMATES: Where reduced with sugar and sulphuric acid, or sulphur dioxide, to produce basic chromium sulphate for tanning.

CHROMIC ACID: Electro-plating solutions.

COAL TAR REFINING: Lead-lining for agitators, piping and pumps; and in the extraction of pyridene.

COPPER SULPHATE: Lead-lined tanks are one of the most important requirements in the manufacture of this product.

DYES: Miscellaneous uses.

ELECTRO-PLATING: Acid strip tanks, acid storage, etc. Used in handling some solutions of copper, chrome, nickel, hydrofluoric acid, etc.

ETHER: Has practically no effect on lead.

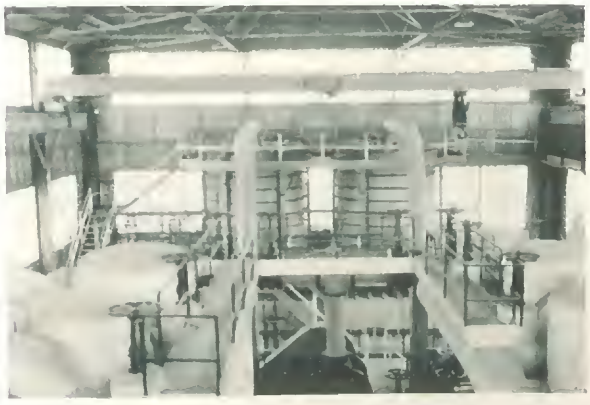
FERRIC SULPHATE: Lead may be used to handle this in solution, or when dry.

GLAUBER'S SALT: See "Sodium Sulphate."

GLYCERINE: Nitrators, cooling coils, separators, purifiers, storage, etc. In treating dilute liquors before concentrating to crude glycerine.

GYPSUM: In solid state has practically no effect on lead.

HYDROCHLORIC ACID (Muriatic Acid): Lead may be used to handle dilute solutions of ten percent to thirty percent at temperatures of 20°C. to 80°C. Also in concentrations of one percent to five percent at temperatures of 20°C. to 30°C. Corrosion increases as temperature is raised. Anitmonial "hard" lead is generally preferable to pure lead. Some authorities state that lead with high antimony content will satisfactorily handle any strength of hydrochloric at cold temperature, and up to 212°C. in concentrations under eighteen percent.



Gay-Lussac Towers in H_2SO_4 plant, using Bunker Hill Lead.

HYDROCYANIC ACID: For reaction chambers, acid lines, linings, etc. In contact with sulphuric acid, steam and cyanide salt. Lead should not, however, be used in contact with pure liquid hydrocyanic acid.

HYDROFLUORIC ACID: Lead may be used for the handling of dilute solutions, but pure hydrofluoric acid will corrode it. Commonly used for condensors, pans, tanks, tubes, etc.

HYDROGEN CHLORIDE (Anhydrous): Has very little effect on lead.

IODINE: In some iodine processes, lead equipment is employed.

KOCH ACID REDUCTION MASS: Lead may be satisfactorily used in connection with this material.

LITHOPONE MANUFACTURE: In the making of zinc solution and in the purification system.

MIXED ACIDS: Nitrators and various lead equipment for handling many types of mixed acids. With water content higher than twenty percent, lead is usually employed.

MOTHER LIQUORS: Most of the mother liquors are handled satisfactorily with lead or lead-lined equipment.

MURIATIC ACID: See "Hydrochloric Acid."

NITRIC ACID: Lead may be used in concentrations of eighty percent or more, but is attacked appreciably in dilute solutions. Sulphuric and nitric acid mixtures may be handled in lead when the nitric content is between ten percent and twenty percent. High temperatures should be avoided. The addition of ten percent sodium sulphate crystals to dilute waste acid retards appreciably the corrosion of lead.

NITRO-GLYCERINE: For spent acid tanks, denitrators, mixers, etc. (See also "Nitric Acid.")

OXY-L ACID: Although lead is not suitable for all purposes, it is the only common metal that withstands the reactions of the process as a whole satisfactorily.

PHENOLS: Most authorities agree that phenol has no action on lead.

PHOSPHORIC ACID: Lead is perhaps the most satisfactory of common metals, but when out of contact with the solution the lead must be protected from attack by the gases. The corrosion rate of lead is low in dilute C.P. acid up to fifty percent concentration. The presence of sulphuric acid in the phosphoric solution decreases the corrosion rate of the metal. Temperature ranges from 80°C. to 100°C. have no effect on the rate of corrosion.

PHOTOGRAPHIC SOLUTIONS: Lead is commonly used in the handling of photographic solutions.

PYRIDINE: Has practically no effect on lead. (See also "Coal Tar Refining.")

RAYON MANUFACTURE: In Viscose, Cuprammonium and Nitro-cellulose processes. For spinning machine parts, acid lines, wash and bleach catch tanks, etc.

SOAP MANUFACTURE: Lead-lined tanks, piping and trays for acid washing of fats.

SODIUM BISULPHATE: Aqueous solutions of sodium bisulphate are commonly handled in lead or lead-lined equipment. Concentrations high enough to solidify when cool do not greatly affect lead.

SODIUM BISULPHITE: Precipitation tanks, etc.

SODIUM CARBONATE: A one-fifth normal solution has no corrosive effect on lead.

SODIUM CHLORIDE: Sea water and normal commercial solutions of this salt have practically no effect on lead. Temperatures should be kept below 100°C.

SODIUM HYDROSULPHITE: Concentrations to twenty percent. Temperatures to 30°C.

SODIUM HYPOSULPHITE.

SODIUM SILICATE: Has a retarding influence upon the oxidation of lead. Plumbo-solvent waters conveyed in lead are often treated with sodium silicate to reduce the corrosion rate.

SODIUM SULPHATE (Salt Cake): Lead lined tanks, separators, lead pans, etc. The corrosion rate is lower at elevated temperatures up to the boiling point. Solutions of ten percent are commonly handled at high temperatures.

SODIUM SULPHIDE: Solutions of five percent to twenty-five percent may be satisfactorily handled in lead at temperatures of 20°C. to 100°C.

SODIUM SULPHITE: Solutions up to twenty percent. Temperatures around 25°C.

STEARIC ACID and RED OIL: Acid-washing of fats, saponifying tanks, and in the remelting of acid cake.

SULPHONATIONS.

SULPHUR CHLORIDE: Has practically no action on lead.

SULPHUR DIOXIDE GAS (Moist): At temperatures of 20°C. to 201°C. Dry gas may be handled at higher temperatures.

SULPHUR TRIOXIDE GAS.

SULPHURIC ACID: Up to 60° Be. (77.7%) has only slight action on lead, even at temperatures near boiling. At cold temperature the action is very slight up to ninety-six percent concentration.

It is a general rule that hot acid from 60° Be. to 66° Be. should be handled in cast iron or steel, but that lead may safely be employed for cold temperatures in these densities.

For specific purposes some special lead alloys have been developed to withstand severe sulphuric acid service. Details supplied on request.

SULPHUROUS ACID: Lead equipment is commonly used in either low or strong concentrations of sulphurous acid, with temperatures up to 295°C. in some instances.

SULPHURYL CHLORIDE.

TARTARIC ACID: For evaporator tubes and bodies, and the handling of early stage liquors. Contact with air should be avoided in the use of lead with this material.

THIONYL CHLORIDE: This material has practically no effect on lead, even at temperatures up to 200°C.

TITANIUM SULPHATE: Lead is successfully used in the processing of this material.

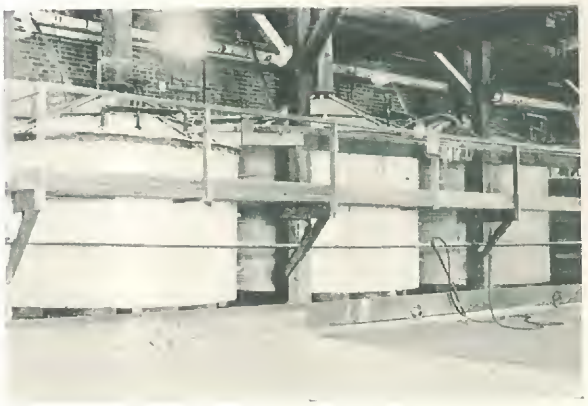
WATER: Lead is undissolved by waters of usual hardness, but soft waters may be plumbo-solvent—especially moorland waters containing organic acids. Plumbo-solvent waters treated with calcium carbonate, bicarbonate, lime, chromate, or sodium silicate, however, may be safely carried in lead piping. In general, the addition of chlorides and nitrates in water will increase the corrosion of lead, while the addition of sulphates will decrease the corrosion rate.

Lead is attacked by distilled water in the presence of oxygen.

Lead is superior to other ordinary metals in contact with sea water and is widely used for marine work of all kinds.

Water containing carbon dioxide has but little action upon lead, in the absence of oxygen.

ZINC CHLORIDE.



Aluminum Sulphate agitator tanks, lined with Bunker Hill Lead.

CHEMICAL SUBSTANCES AND THEIR COMMON NAMES

Common Name	Chemical Name
Alcohol	Ethyl alcohol
Alum	Potassium aluminum sulphate
Aqua fortis	Nitric acid
Aqua Regia	Nitro-hydrochloric acid
Banana ether	Amyl acetate
Black Lead	Graphite carbon
Borax	Sodium tetraborate
Brimstone	Sulphur
Calomel	Mercurous chloride
Carbolic acid	Phenol
Caustic potash	Potassium hydroxide
Caustic soda	Sodium hydroxide
Chalk	Calcium carbonate
Choke damp	Carbon dioxide.
Chrome yellow	Lead chromate
Chrome green	Chromium oxide
Clay	Aluminium silicate
Copperas	Ferrous sulphate
Corrosive sublimate	Mercuric chloride
Cream of tartar	Potassium hydrogen tartrate
Epsom salts	Magnesium sulphate
Fire damp	Methane
Fusel oil	Amyl alcohol
Glauber's salt	Sodium sulphate
Grape sugar	Glucose
Goulard water	Basic lead acetate
Iron pyrites	Iron disulphide
Laughing gas	Nitrous oxide
Lime, quick	Calcium oxide
Lime, slaked	Calcium hydroxide
Litharge	Lead oxide
Lunar caustic	Silver nitrate

Common Name	Chemical Name
Marsh gas	Methane
Mosaic gold	Stannic sulphide
Muriatic acid	Hydrochloric acid
Orpiment	Arsenic trisulphide
Paris green	Copper arsenite
Plaster of Paris	Calcium sulphate
Prussian blue	Ferric ferrocyanide
Realgar	Arsenic disulphide
Red Lead	Lead oxide
Rochelle Salt	Sodium potassium tartrate
Sal ammoniac	Ammonium chloride
Salt, common	Sodium chloride
Salt of tartar	Potassium carbonate
Saltpetre	Potassium nitrate
Salts of lemon	Oxalic acid
Soda, washing	Sodium carbonate
Soda, baking	Sodium hydrogen carbonate
Soda, ash	Sodium carbonate
Spirit of hartshorn	Ammonium hydroxide
Spirits of salt	Hydrochloric acid
Tartar emetic	Potassium antimonyl tartrate
Verdigris	Basic copper acetate
Vermilion	Mercuric sulphide
Vinegar	Acetic acid
Vitriol, blue	Copper sulphate
Vitriol, green	Ferrous sulphate
Vitriol, oil of	Sulphuric acid
Vitriol, white	Zinc sulphate
Volatile alkali	Ammonium hydroxide
White lead	Basic lead carbonate
Wood alcohol	Methyl alcohol
Zinc white	Zinc oxide

SOME USEFUL CONSTANTS OF LEAD

WEIGHT AND DENSITY

Density: 11.34-11.37 gm. per cu. cm.

Weight: 0.4092 lb. per cu. in.
(equivalent to) 707 lb. per cu. ft.

Sheet lead, 1 ft. sq. x 1/64 in. thick weighs approximately 1 lb.

Volume of 1 lb. of cast lead: 2.44 cu. in.

THERMAL DATA

Melting point: 327.4° C. (621°F.).

To melt 1 lb. of lead, heating from 20°C. (68°F.) requires 7100 gm. cal. or 28.4 B.T.U.

Coefficient of linear expansion (17°C. to 100°C.): .0000293 per deg. C.
(equivalent to) .0000163 per deg. F.

Increase in volume from 20°C. to liquid at melting point: 6.1 percent.

Decrease in volume on solidifying: 3.85 percent.

Increase in volume on melting: 4.01 percent.

Shrinkage on casting taken in practice as 7/64 to 5/16 in. per ft.

Shrinkage in volume calculated from liquid at melting point to 20°C.: 5.8 percent.

Linear expansion per 100°F. over a 10 ft. length: about 0.2 in.

MECHANICAL CONSTANTS

Hardness, Moh's scale: 1.5.

Brinnell number, 1 cm. ball, 30 sec., 100 kg. load:
Ordinary Soft Lead: 3.2 to 4.5.
Copper-Alloy Lead: 4.5 to 6.

Influence of temperature on Brinnell hardness:

	25°C.	100°C.	150°C.
Copper-Alloy Lead	5.3	3.6	2.6

Elastic limit: 200 lb. per sq. in.

Maximum load in tension that lead will withstand for an indefinite time: 200 to 400 lb. per sq. in.

Ultimate tensile strength, quick test:

Soft Lead	1400 to 1700 lb. per sq. in.
Copper-Alloy Lead	2300 to 2800 lb. per sq. in.
Wire, hard "drawn"	3130 lb. per sq. in.

ELECTROCHEMICAL SERIES OF THE METALS

In this list each metal is electropositive to all that precede it; that is, two metals in contaet in the presence of an electrolyte form a galvanic couple which tends to cause the more electropositive to be dissolved by electrolysis:

Gold	Thallium
Platinum	Cadmium
Palladium	Iron
Silver	Chromium
Mercury	Zinc
Copper	Manganese
Arsenic	Aluminum
Bismuth	Magnesium
Antimony	Calcium
Hydrogen	Strontium
Lead	Sodium
Tin	Barium
Nickel	Potassium
Cobalt	Lithium

SOLDER COMPOSITIONS AND MELTING POINTS

	Tin	Lead	Melting Point °C.	Melting Point °F.
Eutectic	63	37	181	358
Half and Half	50	50	205	401
Wiping	38-40	62-60	242	468

LEAD THE SELF-PROTECTIVE METAL

Note. When lead is exposed to air an infinitesimal film is formed on its surface which protects the metal from further oxidation or attack and accounts for the extraordinary durability of lead. Similarly contact with hard waters—and nearly all water is moderately hard—causes a thin coating on the lead of a carbonate or sulphate which, being insoluble and strongly adherent, protects the metal and prevents any solution of the lead and contamination of the water.

LEAD POISONING

HOW TO PREVENT IT

A. Wash your hands carefully before eating, or taking tobacco or handling anything that will be placed in the mouth.

B. Always rinse out your mouth before taking a drink.

C. After having been in the dust or fumes, spit a few moments thereafter and rinse out your mouth at the first opportunity.

D. Bathe frequently.

E. Either change your clothing before going to work, or put on outside overalls and jumper while at work. This outside clothing should be washed as frequently as possible.

F. When in the vicinity of fumes, hold your breath and pass to the windward as much as possible. Where fumes or dust are abundant, use a respirator.

G. Never work without having eaten a substantial meal. With an empty stomach, conditions are more favorable for absorption of lead by the body.

H. Drink water and milk plentifully.

I. Do not allow yourself to become constipated.

J. Put a little plain vaseline in your nose at the beginning of your shift.

K. If you feel at all sick, consult a doctor at once.

L. Do not keep your mouth open when breathing; breathe through your nose.

M. Use of tobacco, tea and coffee makes one more sensitive to lead; milk makes one less sensitive.

ANTIDOTES FOR POISONS

FIRST—Send for a physician. Induce vomiting by ticking throat with feather or finger, drinking hot water or strong mustard and water. Swallow sweet oil or whites of eggs. Acids are antidotes for alkalies, and vice versa.

ACIDS—Muriatic, Oxalic, Acetic, Sulphuric (Oil of Vitriol), Nitric (Aqua Fortis). Antidote: Soap suds, magnesia, lime water.

PRUSSIC ACID—Antidote: Ammonia in water. Dash water in face.

CARBOLIC ACID—Antidote: Flour and water. Mucilaginous drinks.

ALKALIES—Potash, Lye, Hartshorn, Ammonia. Antidote: Vinegar or lemon juice in water.

ARSENIC—Rat Poison, Paris Green. Antidote: Milk, raw egg, sweet oil, lime water, flour and water.

BUG POISON—Lead, Saltpetre, Corrosive Sublimate, Sugar of Lead, Blue Vitriol. Antidote: Whites of eggs, or milk in large doses.

CHLOROFORM—Chloral, Ether. Antidote: Dash cold water on head and chest.

CARBONATE OF SODA—Copperas, Cobalt. Antidote: Artificial respiration, soapsuds and mucilaginous drinks.

IODINE—Antimony, Tartar Emetic. Antidote: Starch and water, astringent infusions, strong tea.

MERCURY—and its salts. Antidote: Whites of eggs, milk, mucilages.

OPIUM—Morphine, Laudanum, Paregoric, Soothing Powders or Syrups. Antidote: Strong coffee, hot bath. Keep awake and moving at any cost.

NITRATE OF SILVER—Lunar Caustic. Antidote: Salt and water.

STRYCHNINE—Tincture of Nux Vomica. Antidote: Mustard and water, Sulphate of Zinc, absolute quiet. Plug the ears.

DOMESTIC WEIGHTS AND MEASURES

MEASURE OF LENGTH

12 Inches equals 1 Foot.
6 Feet equals 1 Fathom.
3 Feet equals 1 Yard.
5½ Yards equals 1 Rod (or Pole).
40 Rods (or Poles) equals 1 Furlong.
8 Furlongs equals 1 Mile.
69.168 statute Miles equals 1 Degree.
60 Geographical Miles equals 1 Degree.
1,760 Yards (or 5,280 Feet) equals 1 Mile.

Metric System

1 Millimeter equals 0.03937 Inches.
1 Centimeter equals 0.3937 Inches.
1 Meter equals 39.37 Inches (or 3.28083 Feet).
1 Kilometer equals 0.62137 Mile.

AVOIRDUPOIS WEIGHT

27 11/32 Grains equals 1 Drachm (dr.).
16 Drachms equals 1 Ounce (oz.) or 437½ Grains.
16 Ounces equals 1 Pound (lb.) or 7,000 Grains.
28 Pounds equals 1 Quarter (qr.)
4 Quarts equals 1 Hundred-Weight (cwt.).
20 Hundred-Weights equals 1 Ton.
2,240 Pounds equals 1 Long Ton.

TROY WEIGHT

24 Grains equals 1 Pennyweight.
20 Pennyweights equals 1 Ounce, or 480 Grains.
12 Ounces equals 1 Pound, or 5,760 Grains.

APOTHECARIES WEIGHT

20 Grains equals 1 Scruple.
3 Scruples equals 1 Drachm.
8 Drachms equals 1 Ounce.
12 Ounces equals 1 Pound.

MEASURES OF SURFACE

144 Square Inches equals 1 Square Foot.
9 Square Feet equals 1 Square Yard.
30¼ Square Yards equals 1 Square Rod (Perch or Pole.).
40 Square Rods equals 1 Square Rood.
4 Square Roods equals 1 Square Acre.
Gunter's Chain equals 22 Yards or 100 Links.
10 Square Chains equals 1 Square Acre.
640 Square Acres equals 1 Square Mile.
272¼ Square Feet equals 1 Square Rod.
43,560 Square Feet equals 1 Acre.
To find the surface of a ball or sphere, multiply the square of the diameter by 3.1416

MEASURES OF SOLIDARITY

1,728 Cubic Inches equals 1 Cubic Foot.
27 Cubic Feet equals 1 Cubic Yard.
To find the cubic inches in a ball, multiply cube of the diameter by .5236.
A cubic foot of water contains 7½ gallons, 1,728 cubic inches, and weighs 62.4 pounds.

LIQUID MEASURE

4 Gills equals 1 Pint.
2 Pints equals 1 Quart.
4 Quarts equals 1 Gallon.
31½ Gallons equals 1 Barrel.
63 Gallons equals 1 Hogshead, (Hhd.).
252 Gallons equals 1 Tun.

DRY MEASURE

8 Quarts equals 1 Peck.
4 Pecks equals 1 Bushel.
8 Bushels equals 1 Quarter.
36 Bushels equals 1 Chaldron.
1 Bushel equals 2,150.42 Cubic Inches.

PROPERTIES OF A CIRCLE

Circumference of a circle = diameter × 3.1416.
Circumference of a circle = radius × 6.2832.
Diameter of a circle = circumference × .3183.
Diameter in inches of a circle = 13.5405 $\sqrt{}$ area in square feet.
Radius in inches of a circle = circumference × 0.159155.
Area in square feet in a circle = diameter in inches squared × .0054542.
Area of a circle = diameter squared × .7854.
Surface of sphere = diameter squared × 3.1416.

MULTIPLIERS FOR FACILITATING CALCULATIONS

Cubic inches × .4092 = lbs. of cast lead.
Cubic inches × .3225 = lbs. of copper.
Cubic inches × .0938 = lbs. of aluminum
Cubic inches × .268 lbs. of tin.
Cubic inches × .304 = lbs. of brasss.
Cubic inches × .253 = lbs. of zinc.
Cubic inches × .260 = lbs. of cast iron.

Cubic inch of lead weighs 6 7/12 ounces.
Cubic foot of lead weighs 707 pounds.

USEFUL WATER DATA

1 cu. ft. of fresh water weighs 62.4 lb.; equivalent to 7.48 U.S. gallons.
1 U.S. gallon of fresh water weighs 8.33 lb.; equivalent to 0.1134 cu. ft., or 231 cu. in.
1 British Imperial gallon of fresh water contains 277.408 cu. in.
1 cu. ft. of sea water weighs 64.3 lb., approximately.
1 Miner's inch = 1½ cu. ft. per minute = 11.25 U.S. gallons per minute.
Head of water in feet = Pressure in lb. per sq. in × 2.307.
Pressure in lb. per sq. in. = Head of water in feet × 0.4335.

CONVERSION FACTORS

liters	× 0.2642	= U.S. gallons	kilowatts	× 1.34	= horsepower
liters	× 61.022	= cubic inches	horsepower	× 746.	= watts
inches	× 25.4	= millimeters	4 gills		= 1 pint
millimeters	× 0.03937	= inches	2 pints		= 1 quart
kilograms	× 2.2046	= pounds	4 quarts		= 1 gallon
pounds	× 453.59	= grams	31.5 gallons		= 1 barrel
			2 barrels		= 1 hogshead

THERMOMETER COMPARISON

	Freezing point	Boiling point
Fahrenheit	32 degrees	212 degrees
Reaumur	zero	80 degrees
Centigrade	zero	100 degrees

EQUIVALENTS

Fahrenheit to Reaumur	—Subtract 32, multiply by four-ninths.
Fahrenheit to Centigrade	—Subtract 32, multiply by five-ninths.
Reaumur to Fahrenheit	—Multiply by nine-fourths, add 32.
Reaumur to Centigrade	—Multiply by five-fourths.
Centigrade to Fahrenheit	—Multiply by nine-fifths, add 32.
Centigrade to Reaumur	—Multiply by four-fifths.

COMPARATIVE SCALES

Centigrade to Fahrenheit

C.	F.	C.	F.	C.	F.	C.	F.
−30 =	−22.0	−14 =	6.8	2 =	35.6	18 =	64.4
−29 =	−20.2	−13 =	8.6	3 =	37.4	19 =	66.2
−28 =	−18.4	−12 =	10.4	4 =	39.2	20 =	68.0
−27 =	−16.6	−11 =	12.2	5 =	41.0	21 =	69.8
−26 =	−14.8	−10 =	14.0	6 =	42.8	22 =	71.6
−25 =	−13.0	−9 =	15.8	7 =	44.6	23 =	73.4
−24 =	−11.2	−8 =	17.6	8 =	46.4	24 =	75.2
−23 =	−9.4	−7 =	19.4	9 =	48.2	25 =	77.0
−22 =	−7.6	−6 =	21.2	10 =	50.0	26 =	78.8
−21 =	−5.8	−5 =	23.0	11 =	51.8	27 =	80.6
−20 =	−4.0	−4 =	24.8	12 =	53.6	28 =	82.4
−19 =	−2.2	−3 =	26.6	13 =	55.4	29 =	84.2
−18 =	−0.4	−2 =	28.4	14 =	57.2	30 =	86.0
−17 =	1.4	−1 =	30.2	15 =	59.0	50 =	122.0
−16 =	3.2	0 =	32.0	16 =	60.8	100 =	212.0
−15 =	5.0	1 =	33.8	17 =	62.6		

CIRCLES AND TANKS
DIAMETERS—CIRCUMFERENCES—AREAS—CONTENTS

Diameter, Inches	Circumference, Inches	Area, Inches	Gallons 1 Ft. Depth
1	3.1416	.7854	.04084
1/4	3.9270	1.2271	.06380
1/2	4.7124	1.7671	.09188
3/4	5.4978	2.4052	.12506
2	6.2832	3.1416	.16333
1/4	7.0686	3.9760	.20675
1/2	7.8540	4.9087	.25522
3/4	8.6394	5.9395	.30883
3	9.4248	7.0686	.36754
1/4	10.210	8.2957	.43134
1/2	10.995	9.6211	.50029
3/4	11.781	11.044	.57429
4	12.566	12.566	.65343
1/4	13.351	14.186	.73767
1/2	14.137	15.904	.82701
3/4	14.922	17.720	.92144
5	15.708	19.635	1.02102
1/4	16.493	21.647	1.12564
1/2	17.278	23.758	1.23542
3/4	18.064	25.967	1.35028
6	18.849	28.274	1.47025
1/4	19.635	30.679	1.59531
6 1/2	20.420	33.183	1.72552
3/4	21.205	35.784	1.86077
7	21.991	38.484	2.00117
1/4	22.776	41.282	2.14666
1/2	23.562	44.178	2.29726
3/4	24.347	47.173	2.45299
8	25.132	50.265	2.61378
1/4	25.918	53.456	2.77971
1/2	26.703	56.745	2.95074
3/4	27.489	60.132	3.12686
9	28.274	63.617	3.30408
1/4	29.059	67.200	3.49440
1/2	29.845	70.882	3.68586
3/4	30.630	74.662	3.88242
10	31.416	78.540	4.08408
1/4	32.201	82.516	4.29083
1/2	32.986	86.590	4.50268
3/4	33.772	90.762	4.71962
11	34.557	95.033	4.94172
1/4	35.343	99.402	5.16890
1/2	36.128	103.869	5.40119
3/4	36.913	108.434	5.63857

ONE FOOT DIAMETER AND LARGER

Diameter, Ft.	Diameter, In.	Circumference, Ft.	Circumference, In.	Area Feet	Gallons 1 Ft. Depth	Diameter Feet	Diameter Ins.	Circumference, Feet	Circumference, Ins.	Area, Feet	Gallons 1 Ft. Depth
1		3	1 5/8	.7854	5.8735	4	8	14	7 3/8	17.1041	127.9112
1	1	3	4 3/8	.9217	6.8928	4	9	14	11	17.7205	132.5209
1	2	3	8	1.0690	7.9944	4	10	15	2 1/8	18.3476	137.2105
1	3	3	11	1.2271	9.1766	4	11	15	5 1/4	18.9858	142.0582
1	4	4	2 1/8	1.3962	10.4413	5		15	8 1/2	19.6350	146.8384
1	5	4	5 3/8	1.5761	11.7866	5	1	15	11 5/8	20.2947	151.7718
1	6	4	8 1/2	1.7671	13.2150	5	2	16	2 3/4	20.9656	156.7891
1	7	4	11 5/8	1.9689	14.7241	5	3	16	5 7/8	21.6475	161.8886
1	8	5	2 3/4	2.1816	16.3148	5	4	16	9	22.3400	167.0674
1	9	5	5 7/8	2.4052	17.9870	5	5	17	0 1/8	23.0437	172.3300
1	10	5	9	2.6398	19.7414	5	6	17	3 1/4	23.7583	177.6740
1	11	6	2 1/4	2.8852	21.4830	5	7	17	6 3/8	24.4835	183.0973
2		6	3 3/8	3.1416	23.4940	5	8	17	9 5/8	25.2199	188.6045
2	1	6	6 1/2	3.4087	25.4916	5	9	18	0 3/4	25.9672	194.1930
2	2	6	9 5/8	3.6869	27.5720	5	10	18	3 7/8	26.7251	199.8610
2	3	7	0 3/4	3.9760	29.7340	5	11	18	7 1/8	27.4943	205.6133
2	4	7	3 7/8	4.2760	32.6976	6		18	10 1/8	28.2744	211.4472
2	5	7	7	4.5869	34.3027	6	3	19	7 1/2	30.6796	229.4342
2	6	7	10 1/4	4.9087	36.7092	6	6	20	4 7/8	33.1831	248.1564
2	7	8	1 3/8	5.2413	39.1964	6	9	21	2 3/8	35.7847	267.6122
2	8	8	4 1/2	5.5850	41.7668	7		21	11 7/8	38.4846	287.8230
2	9	8	7 5/8	5.9395	44.4179	7	3	22	9 1/4	41.2825	308.7270
2	10	8	10 3/4	6.3049	47.1505	7	6	23	6 3/4	44.1787	330.3859
2	11	9	1 7/8	6.6813	49.9654	7	9	24	4 1/8	47.1730	352.7665
3		9	5	7.0686	52.8618	8		25	1 1/2	50.2656	375.9062
3	1	9	8 1/4	7.4666	55.8382	8	3	25	11	53.4562	399.7668
3	2	9	11 3/8	7.8757	58.8976	8	6	26	8 3/8	56.7451	424.3625
3	3	10	2 1/2	8.2957	62.0386	8	9	27	5 3/4	60.1321	449.2118
3	4	10	5 5/8	8.7265	65.2602	9		28	3 1/4	63.6174	475.7563
3	5	10	8 3/4	9.1683	68.5193	9	3	29	0 5/8	67.2007	502.5536
3	6	10	11 7/8	9.6211	73.1504	9	6	29	10 1/8	70.8823	530.0861
3	7	11	3	10.0846	75.4166	9	9	30	7 1/2	74.6620	558.3522
3	8	11	6 1/8	10.5591	78.9652	10		31	5	78.5400	587.3534
3	9	11	9 3/8	11.0446	82.5959	10	3	32	2 3/8	82.5160	617.0876
3	10	12	0 1/2	11.5409	86.3074	10	6	32	11 3/4	86.5903	647.5568
3	11	12	3 5/8	12.0481	90.1004	10	9	33	9 1/4	90.7627	678.2797
4		12	6 3/4	12.5664	93.9754	11		34	6 5/8	95.0334	710.6977
4	1	12	9 7/8	13.0952	97.9310	11	3	35	4 1/8	99.4021	743.3686
4	2	13	1	13.6353	101.9701	11	6	36	1 1/2	103.8691	776.7746
4	3	13	4 1/8	14.1862	103.0300	11	9	36	10 7/8	108.4342	810.9143
4	4	13	7 1/4	14.7479	110.2907	12		37	8 3/8	113.0976	848.1890
4	5	13	10 1/2	15.3206	114.5735	12	3	38	5 3/4	117.8590	881.3966
4	6	14	1 3/8	15.9043	118.9386	12	6	39	3 1/4	122.7187	917.7395
4	7	14	4 5/8	16.4986	123.3830	12	9	40	0 5/8	127.6765	954.8159

These tables are theoretically correct, but variations must be expected in practice.

COMPARISON OF GAUGES

American or Brown & Sharpe		Birmingham or Stubbs		United States Standard	
No.	Approximate Thickness in Inches	No.	Approximate Thickness in Inches	No.	Approximate Thickness in Inches
34	.0066	35	.005	38	.0062
				37	.0066
33	.0070	34	.007	36	.0070
32	.0079	33	.008	35	.0078
31	.0089	32	.009	34	.0086
				33	.0093
30	.0100	31	.010	32	.0101
29	.0112	30	.012	31	.0109
28	.0126	29	.013	30	.0125
27	.0141	28	.014	29	.0140
26	.0159	27	.016	28	.0156
25	.0179	26	.018	27	.0171
24	.0201	25	.020	26	.0187
23	.0225	24	.022	25	.0218
22	.0253	23	.025	24	.0250
21	.0284	22	.028	23	.0281
20	.0319	21	.032	22	.0312
19	.0353	20	.035	21	.0343
18	.0403			20	.0375
17	.0452	19	.042	19	.0437
16	.0508	18	.049	18	.0500
15	.0570	17	.058	17	.0562
14	.0640	16	.065	16	.0625
13	.0719	15	.072	15	.0703
12	.0808	14	.083	14	.0781
11	.0907	13	.095	13	.0937
10	.1018	12	.109	12	.1093
9	.1144	11	.120	11	.1250
8	.1284	10	.134	10	.1406
7	.1442	9	.148	9	.1562
6	.1620	8	.165	8	.1718
5	.1819	7	.180	7	.1875
4	.2043	6	.203	6	.2031
3	.2294	5	.220	5	.2187
		4	.238	4	.2343
2	.2576	3	.259	3	.2500
		2	.284	2	.2656
1	.2893	1	.300	1	.2812
0	.3249	0	.340	0	.3125
000	.4096	000	.425	000	.3750
				0000000	.5000

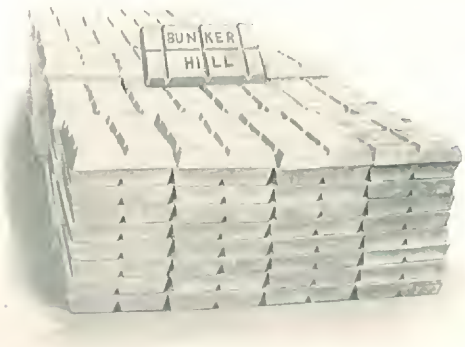
TABLE OF DECIMAL EQUIVALENTS

Thirty-Seconds	Sixty-Fourths	Other Fractions	Decimal	Thirty-Seconds	Sixty-Fourths	Other Fractions	Decimal	Thirty-Seconds	Sixty-Fourths	Other Fractions	Decimal
	1		.015625		21		.328125		41		.640625
1	2		.03125	11	22		.34375	21	42		.65625
	3		.046875		23		.359375		43		.671875
2	4	1/16	.0625	12	24	3/8	.375	22	44	11/16	.6875
									45		.703125
	5		.078125		25		.390625	23	46		.71875
3	6		.09375	13	26		.40625		47		.734375
	7		.109375		27		.421875	24	48	3/4	.75
4	8	1/8	.125	14	28	7/16	.4375				
									49		.765625
	9		.140625		29		.453125	25	50		.78125
5	10		.15625	15	30		.46875		51		.796875
	11		.171875		31		.484375	26	52	13/16	.8125
6	12	3/16	.1875	16	32	1/2	.5				
									53		.828125
	13		.203125		33		.515625	27	54		.84375
7	14		.21875	17	34		.53125		55		.859375
	15		.234375		35		.546875	28	56	7/8	.875
8	16	1/4	.25	18	36	9/16	.5625				
									57		.890625
	17		.265625		37		.578125	29	58		.90625
9	18		.28125	19	38		.59375		59		.921875
	19		.296875		39		.609375	30	60	15/16	.9375
10	20	5/16	.3125	20	40	5/8	.625				
									61		.953125
								31	62		.96875
									63		.984375
								32	64	1	1.

DECIMAL EQUIVALENTS—OUNCES AND POUNDS

Ounces	Pounds	Ounces	Pounds	Ounces	Pounds	Ounces	Pounds
1/4	.015625	3	.1875	6 1/2	.4063	11	.6875
1/2	.03125	3 1/4	.21875	7	.4375	12	.75
3/4	.046875	4	.25	7 1/2	.4688	13	.8125
1	.0625	4 1/2	.2813	8	.50	14	.875
1 1/2	.09375	5	.3125	8 1/2	.5313	15	.9375
2	.125	5 1/2	.3438	9	.5625	16	1.00
2 1/2	.15625	6	.375	10	.625		

BUNKER HILL 99.99+% PURE ELECTROLYTIC ZINC



Bunker Hill Electrolytic Zinc is supplied in slabs weighing approximately sixty pounds each—grooved to form four ten-pound units and four five-pound units.

Bunker Hill Zinc, 99.99+% pure, is consistently produced at all times. This high grade product will vary less than .003% in zinc content. It is this guaranteed, consistent, high quality, that assures the die-caster, the galvanizer, and the rolling and wire mills, uniformity in their products.

Some of the advantages of this high-purity metal are: Greater ductility than that of the high grade brands known previously; elimination of hot-shortness (except in extreme cases) in die casting; greater tensile strength and elongation; and increased resistance to impact and corrosion.

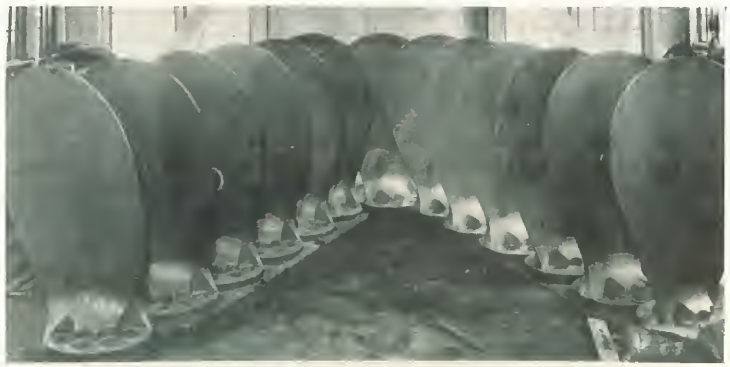
The use of 99.99+% zinc has made it possible to use zinc base die castings where they have never been used before. By using alloys of aluminum and copper with Bunker Hill zinc, die castings for many purposes can be turned out with a finished surface which does not require machining. Zinc base castings permit making complicated shapes, ornamental details, and smooth, easily finished surfaces.

The use of this product in the high-grade zinc field is practically limitless. The consistency of its 99.99+% purity will prove valuable in many operations—some of which are listed below.

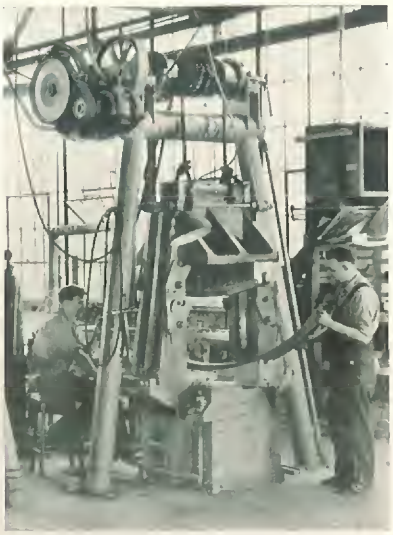
PRINCIPAL USES

Alloys of Pure Metals	Castings	Ribbon Zinc
Brass:	Die Castings	Sheet Zinc
Rods, Cartridge,	Drawing	Spinning
Sheet, Etc.	Extruding	Stamping
Manganese Bronze	Galvanizing	Strip Zinc

Cast bronze marine fitting. One of many specialties of Coolidge Propellor Co., Seattle.



An assembly of Manganese bronze propellor blades at plant of Doran Co., Seattle. Bunker Hill Zinc is used in the manufacture of these blades.



Drop hammer operation at plant of Boeing Aircraft Company, Seattle, and detail of male and female dies made of Bunker Hill Zinc. The softness of the zinc dies eliminates fracture of aluminum and other metals in this process.

INDUSTRIAL USES OF BUNKER HILL ZINC

Bunker Hill Electrolytic Zinc is a metal of extreme purity, softness and ductility. Strip and ribbon made from it can be rolled to .003″ without cracking on edges and some operators report savings in power bills because of the ease with which it can be rolled.

Galvanizers find it valuable, as it will not corrode or flake off when working. When ordinary galvanized iron is submitted to certain bending strains, minute openings appear in the zinc coating, providing points where corrosion begins. Bunker Hill Zinc, extremely ductile, will withstand an almost unbelievable amount of twisting and bending without fracture.

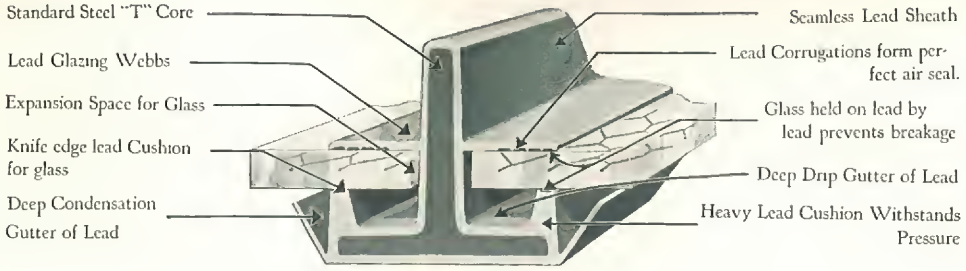
In general casting work and the making of alloys the uniformity of Bunker Hill Zinc is invaluable. In addition to its casting qualities, it is often found possible to re-vitalize three or four times as much gate scrap as previously, with a given amount of new zinc.

Pouring zinc metal alloys, using Bunker Hill Brand Electrolytic zinc, because of its extreme purity.

Putting finishing touches on a huge Manganese bronze propellor. Manganese Bronze, with an alloy of Bunker Hill 99.99+% Zinc, will cast and machine better.

NORTHWEST LEAD COMPANY

STEELEAD SKYLIGHT DIVISION



Cross Section of Steelead Bar.

WHAT STEELEAD IS

Steelead is the name of a lead-sheathed steel skylight bar construction that combines the strength of steel with the non-corrosive, permanent qualities of lead.

In addition to completely sealing the steel bar with an impervious lead jacket, the sheath is so designed as to be a perfect support and grip for the glass. This composes the special patented design of Steelead skylight construction.

At the base of the bar the lead is formed into a cushion, drawn to a thin edge on top, on which the glass rests. The softness of the lead, under the weight of the glass, conforms to the unevenness in the glass and makes a tight, cushioned joint, forming at the same time a deep drop gutter to catch any possible leakage.

Lead glazing webs are formed on the bar, which, after the glass is in place on the lead seat, are pressed down. These webs, or wings, also conform to any surface irregularities and make a dust-proof and watertight seal.

When glass is held in close contact by metals subject to unequal contraction and expansion through temperature changes, frequent breakage often results. If putty is used as a bedding or cushion, the putty in time becomes brittle and loose, requiring frequent replacement. In Steelead construction the danger of glass breakage is reduced to the minimum, because the soft lead cushion under the glass and a soft lead web above the glass insure the necessary elasticity. This is especially important in buildings where there is considerable vibration.

In Steelead skylight construction the danger of glass breakage is reduced to a minimum. The glass rests upon lead and is held by lead, without packing or putty. It is tight, yet free to expand and contract.

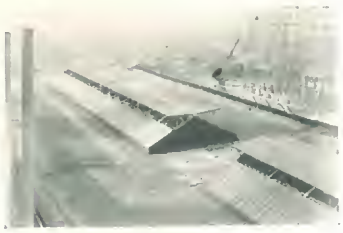
A 45-foot by 120-foot Steelead Skylight on the Memorial Gymnasium, University of Idaho.

NORTHWEST LEAD COMPANY

STEELEAD

Steelead Skylight over filtration plant of a Western water system.

Steelead is strong! Note men walking on this office building skylight.



Operating Ventilator Steelead Skylights on a Southern power plant.

TYPICAL WESTERN INSTALLATIONS

UNIV. OF MONTANA GYMNASIUM
Missoula, Montana
Architect: Geo. H. Carsley, (Helena).

SEATTLE FIRST NATIONAL BANK
Seattle, Washington.
Architects: Doyle and Merriam.

SOUTHERN CALIF. EDISON CO., POWER PLANT
West Long Beach, California.
Architects: Engineering Department.

TERRITORIAL OFFICE BUILDING
Honolulu, Hawaii.
Architect: Department of Public Works.

RENTON HIGH SCHOOL
Renton, Washington.
Architect: Wm. Mallis (Seattle).

HOLY CROSS MAUSOLEUM
Lawndale, California.
Architect: Henry A.Minton,(San Francisco)

GREAT WESTERN POWER CO. STEAM PLANT
San Francisco, California.
Archts.: McClellan & Junkersfeld, (N. Y.)

PUGET SOUND POWER & LIGHT CO.
Shuffleton (Renton), Washington.
Architect: Engineering Department.

PHYSICAL EDUCATION BUILDING
University of Redlands, (California).
Archts.: N. F. Marsh & Co., (Los Angeles)

STANDARD OIL REFINERY
Richmond, California.
Architect: Engineering Department.

FEDERAL LAND BANK
Spokane, Washington.
Architects: Whitehouse & Price.

HOTEL VANCOUVER
Vancouver, British Columbia.
Architect: R. T. Garrow.

ROOSEVELT HIGH SCHOOL
Seattle, Washington.
Architect: F. A. Naramore.

NORTHWESTERN NATIONAL BANK BUILDING
Portland, Oregon.
Architect: Frederick Westcott.

IDAHO STATE HOSPITAL
Blackfoot, Idaho.
Architect: C. Richardson, (Lewiston).

SOUTH HIGH SCHOOL
Salt Lake City, Utah.
Architects: Scott & Welch.

CIVIC AUDITORIUM & ARENA
Seattle, Washington.
Architects: Schack, Young & Myers.

FILTRATION PLANT WATER DEPARTMENT
Sacramento, California.
Architects: Engineering Department.

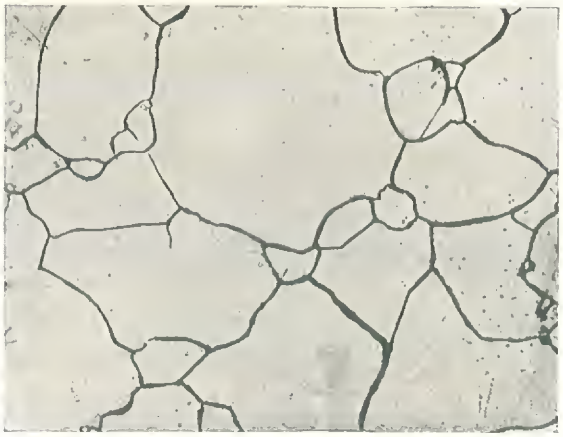
Steelead installations. Left: Washington State College Gymnasium. Center: Hooker Electrochemical Company plant, Tacoma. Right: Southern California Edison Power Plant, West Long Beach.

BUNKER HILL PRODUCTS PURE LEAD - LEAD ALLOYS

NORTHWEST LEAD COMPANY

TELLURIUM ALLOYS

The alloying of pure lead and antimonial lead with Tellurium, for the purpose of improving the chemical and physical properties, is a British discovery and has been patented throughout the world. Both laboratory and field tests, in the United States and foreign countries, prove the claims made for these new alloys to be sound. The Northwest Lead Company manufactures Tellurium alloys under the British-held United States patent.



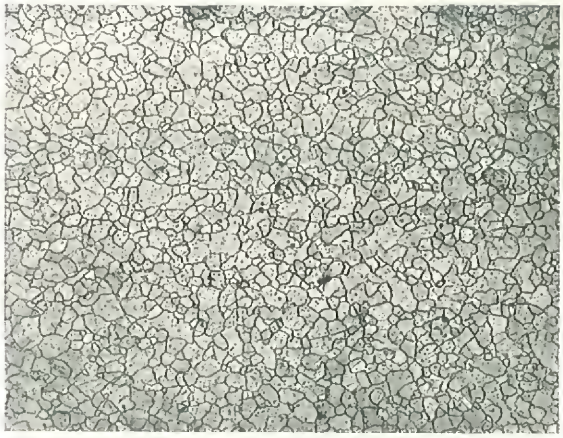
Section of Ordinary Lead Pipe (Magnification x 50)
Note the lack of fine uniform grain structure.

COMPOSITION

Less than one-tenth percent Tellurium is added to any of our commonly used grades of lead to make the alloys. The first consideration in Tellurium alloys is the marked improvement in the physical properties of the lead. Note the pronounced difference in the grain size between pure lead and the Tellurium alloy, as shown on this page.

GRAIN TEXTURE

Tellurium alloys are very fine and close in grain, and this uniform structure is in turn responsible for a marked increase in strength and toughness. Work toughening, a new feature, never before produced in lead or its alloys, is a characteristic of Tellurium alloys. Rolled and extruded products of these alloys present a surface that is perfectly smooth and this smoothness is retained under repeated bendings or strain.

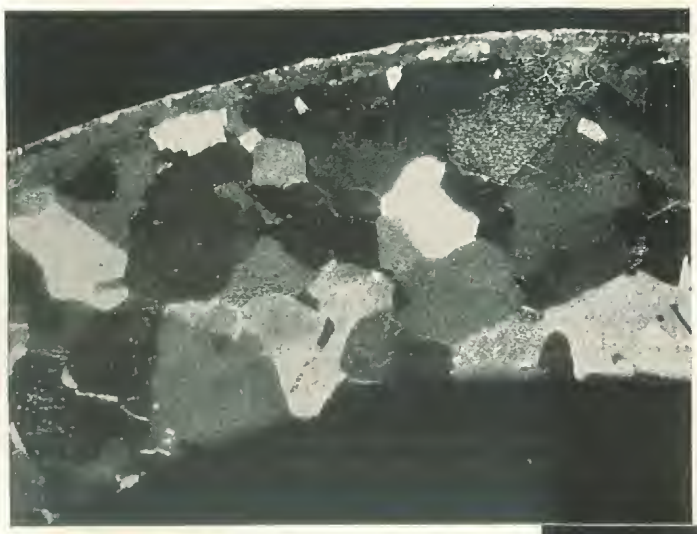


Section of Tellurium Lead Pipe (Magnification x 50)
Compare the fine crystalline structure with the coarse uneven structure of the ordinary lead pipe.

Of equal importance is the increased resistance of the Tellurium alloys to corrosion from the usual industrial chemicals that are manufactured with lead as a part, at least, of the control equipment. Here again, the fine grain structure, the total lack of coarse crystalline formation, presents a uniformly smooth surface, which prevents rapid pitting and breakdown under the most severe conditions.

PHYSICAL CHARACTERISTICS

Many plant failures of lead can be traced directly to physical causes, such as buckling and crawling due to heat, cracking because of vibration, or repeated stress such as we have with water hammer. Tellurium alloys are particularly noteworthy because they do resist the physical breakdown of lead.

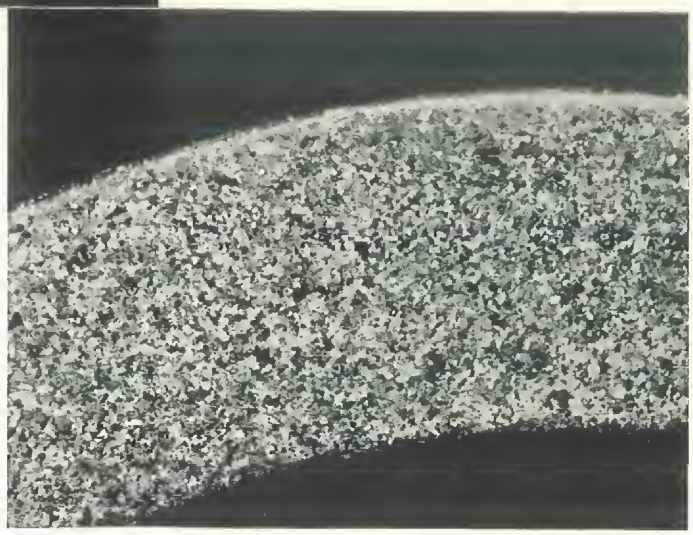


Above: A Section of ordinary lead pipe. Here the grain structure is uneven and coarse (Magnification x 15)

Tellurium alloys of pure lead and antimonial lead are actually very little harder according to Brinnell tests than the leads from which they are made but they do show a very marked toughness, an ability to stand repeated strains without weakening, which the unalloyed leads do not have. Fatigue resistance of Tellurium Lead, sheet and pipe, as determined in a Haigh fatigue-testing machine, is three times greater than that of ordinary lead. This new strength is due to the close uniform grain structure.

Consideration of a few examples of the physical properties of Tellurium alloys will prove the above point.

Below: A section of Tellurium Lead Pipe, an example of fine grain (Magnification x 15)



LATENT STRENGTH

This latent strength feature is brought out by hydraulic tests where a given Tellurium pipe was burst under pressure, and then a similar piece of pipe was stretched, and in turn placed under hydraulic pressure until it burst. The pulled pipe which had a reduced wall thickness withstood a relative pressure of 175 to 100 for the unstretched pipe, an increased ability to withstand hydraulic pressure of seventy-five percent.

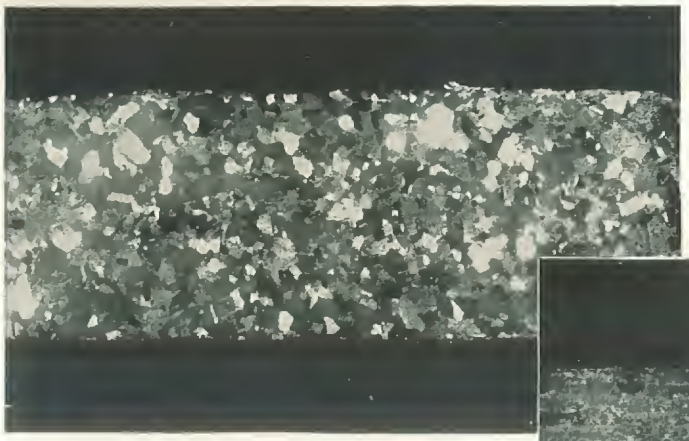
In other tests Tellurium pipe on a given load withstood water hammer for twenty-two months where ordinary lead pipe had failed in from one to four weeks. Freezing of water pipe has always been a source of loss and trouble and here again we find Tellurium lead pipe, with its volume increased twenty-seven percent by expansion due to freezing, and with a resulting thinner wall, retaining its original tensile strength.

HEAT RESISTANCE

Resistance to thermal creep or buckling, by Tellurium Lead, is well illustrated by this example: A conical bottomed steel reaction tank fourteen feet in diameter is used for dissolving zinc scrap. The tank is charged with thirty-five percent sulphuric acid, the zinc scrap added, and the solution is brought to a boiling point with live steam. Scrap is added until the solution is practically neutral when the charge is pumped off. Cold acid is immediately pumped into the tank and the process is repeated. The process is continuous and four charges are run each week. Tellurium lining in this service, after nine months of operation, shows no buckling, and the sheets at the liquor line show no corrosion.

CHEMICAL RESISTANCE

Oil and chemical companies, pulp and paper mills, plating works, and electrolytic refineries have the constant problem of corrosion control. Tellurium alloys show marked improvement over ordinary lead in handling these situations.



Chemical Lead Sheet ⅛" thick. Note the pronounced crystalline structure. (Magnification x 8)

Tellurium Sheet Lead, ⅛" thick. Here the work toughened structure is retained and increased physical properties and corrosion resistance result. (Magnification x 8)

Many tests have been made to find the resistance of Tellurium Lead to sulphuric acid. In one of these, ninety-seven percent sulphuric acid at 300°C. completely dissolved chemical lead in one hour, and nickel lead in two hours, and only caused a loss in weight of 11.52% in Tellurium Lead in two hours. In another case for the cooling of ninety-five percent concentrated sulphuric acid, at a temperature of 200°C. a vessel of Tellurium Lead is used. In this vessel a Tellurium Lead coil is fastened. The process is one in which ordinary chemical lead is not considered. The trial has shown that after three months, Tellurium Lead is giving good service and only one slight repair has been necessary.

ACID CONTROL

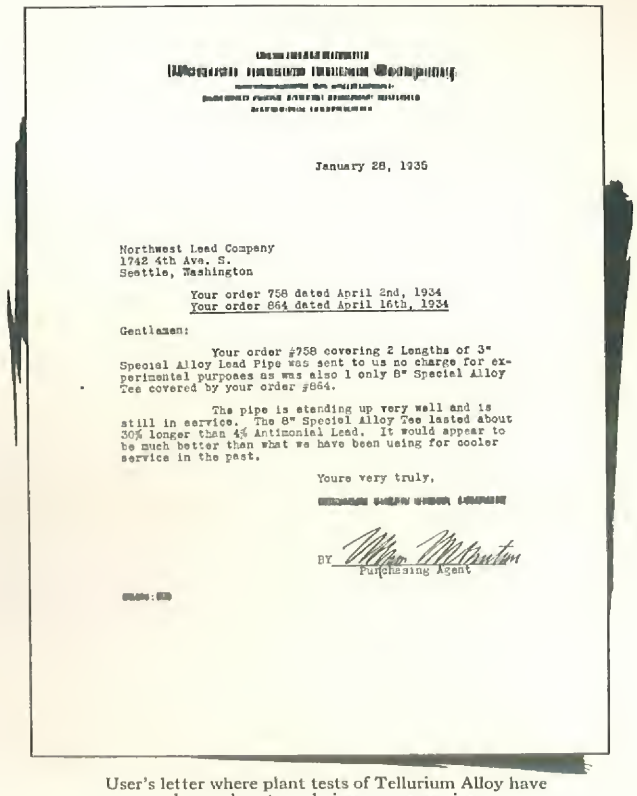
An outstanding example of corrosion resistance is a case where Tellurium Lead is used as anti-splash pipe for the Glover acid. Cooled acid from a Glover tower is led into a short pipe, 2½" in diameter, closed at the top and with a series of holes bored in the sides. All the acid from the tower flows through this pipe into a receiving tank. Ordinary pipe lasts for only three weeks in this service. Tellurium Lead has had to be replaced only after ten or twelve months, and the pipe was uniformly worn to a thin shell.

With phosphoric acid a user reports a Tellurium Lead coil, placed in service in December, 1932, and in constant use up to June, 1933, in an evaporator. They feel that Tellurium Lead has double the life of ordinary lead. Other users report the most satisfactory use of Tellurium lead in handling Chlorine gas, phosphoric acid at 105°C., sulphuric acid in the presence of nitrous compounds at 308°C., and for conducting chamber acid to the top of a Gay Lussac tower.

PULP MILL OPERATIONS

Field tests by sulphite and kraft pulp mills have proven the value of Tellurium Alloys. In the sulphite mills, 6% antimonial lead with .06% Tellurium, is giving excellent results in handling the hot gases from the sulphur burners, in relief coolers, and other heavy duty points. Pure lead alloyed with .06% Tellurium is used for tank linings where an aluminum sulphate solution is made by dissolving the salt in cold water which is agitated and heated with steam. Tellurium Alloys stand heat and abrasion.

NORTHWEST LEAD COMPANY



January 28, 1935

Northwest Lead Company
1742 4th Ave. S.
Seattle, Washington

Your order 758 dated April 2nd, 1934
Your order 864 dated April 16th, 1934

Gentlemen:

Your order #758 covering 2 Lengths of 3" Special Alloy Lead Pipe was sent to us no charge for experimental purposes as was also 1 only 8" Special Alloy Tee covered by your order #864.

The pipe is standing up very well and is still in service. The 8" Special Alloy Tee lasted about 30% longer than 4% Antimonial Lead. It would appear to be much better than what we have been using for cooler service in the past.

Youre very truly,

BY _____ Purchasing Agent

User's letter where plant tests of Tellurium Alloy have lowered costs and given more service

LOWER COSTS

Tellurium alloys of both pure and antimonial lead have been tested in the laboratory and the field by the Northwest Lead Company. We feel that our results, as well as those obtained by British producers and other United States manufacturers, warrant the serious consideration of this product by all lead users who demand better service from their lead installations.

There is little doubt that Tellurium alloys will lower costs, because they will give longer service without repair. They will, in many cases, permit the use of lighter weight sheet and pipe for known loads, and they will in some cases permit the use of lead where only more expensive materials have, in the past, given the desired service.

INSTALLATION

Tellurium sheet and pipe alloys are installed by burning the same as all other types of lead. However, there is one precaution that should be taken—all seams should be built up and then thoroughly hammered, while hot. This breaks down the tension created by the cast nature of the welded seam and insures a fine, tough, uniform grain structure.

WE SUGGEST

Each plant has problems peculiar to itself, and only the operating staff knows what is needed to solve these problems. The Northwest Lead Company submits BUNKER HILL TELLURIUM-LEAD ALLOYS for consideration in every place where lead should be used, and we feel that these alloys will give much better results than usual. If you have a problem where lead has not given the service you feel you should have, we suggest that you try BUNKER HILL TELLURIUM LEAD ALLOYS, either of pure lead or of antimonial lead. Some of our tests have given up to thirty percent better service in field trials, and others are still in operation.

We ask that the operating staffs obtain through their Purchasing Departments, quotations on Tellurium installations. We will be glad to co-operate in any experimental work you may wish to do in your own plant with Tellurium Lead. Prove it in your own plant. Then install Tellurium Lead where you want long, trouble-free service. Please ask for any further information that you may require.

NORTHWEST LEAD COMPANY

2700 Sixteenth Ave. S. W.
SEATTLE, WASHINGTON

SAN FRANCISCO
OAKLAND

LOS ANGELES
SALT LAKE CITY

BUNKER HILL PRODUCTS PURE LEAD - LEAD ALLOYS

THE PURPOSE of this Catalog is to give a general outline of products manufactured under the Bunker Hill Brand name. We invite inquiries covering items not listed herein, and are equipped to produce practically any product made of pure lead or of lead alloys.

☆ ☆ ☆

Without exception, all illustrations in the foregoing pages showing lead and lead installation work, are of Bunker Hill Brand products.

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We are part of The Lead Industries Association and conform to, and support its policies.

Specify

Printed in U. S. A.